

# Integrated Water Quality Report 2011

**SOUTH EAST IRELAND**



# Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

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- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

# Integrated Water Quality Report 2011

## SOUTH EAST IRELAND

June 2012

Edited by Caroline Bowden

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# Contents

<b>Acknowledgements</b>	<b>(ii)</b>
<b>Executive Summary</b>	<b>2</b>
<b>1. Introduction</b>	<b>6</b>
<b>2. Summary of Pressures</b>	<b>8</b>
<b>3. River Water Quality</b>	<b>12</b>
3.1 Sampling Locations	12
3.2 Physico-Chemical Monitoring of Rivers	13
3.2.1 Phosphate in Rivers	13
3.2.2 Nitrate in Rivers	17
3.2.3 Salmonid Rivers	20
3.3 Biological Monitoring of Rivers	21
3.4 Summary	24
<b>4. Lake Water Quality</b>	<b>25</b>
4.1 Physico-Chemical & Biological Monitoring	25
4.2 Assessment of Water Quality	26
4.3 Summary	27
<b>5. Groundwater Quality</b>	<b>28</b>
5.1 Physico-Chemical & Biological Monitoring	28
5.2 Assessment of Water Quality	28
5.3 Summary	31
<b>6. Transitional &amp; Coastal Waters</b>	<b>32</b>
6.1 Physico-Chemical & Biological Monitoring	32
6.2 Assessment of Water Quality	33
6.3 Bathing Waters	34
6.4 Summary	35
<b>7. Overall Assessment and Conclusions</b>	<b>36</b>
<b>8. References</b>	<b>40</b>



## Executive Summary

### Scope

This report presents a review of water quality in the south east of Ireland in 2011. It covers the counties of Carlow, Kilkenny, Laois, Tipperary, Waterford and Wexford, and Waterford City. These counties lie within three river basin districts:

- South-Eastern RBD
- South-Western RBD
- Shannon RBD

It is also a step further along the road of transforming these reports into integrated water quality reports with greater emphasis on the reporting requirements of the Water Framework Directive (WFD). This report therefore also aims to present an assessment of progress towards meeting the objectives of the WFD as set out in the respective River Basin Management Plans.

In 2011, the Annual River report placed greater emphasis on the reporting requirements of the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009). Data for several key parameters – pH, Dissolved Oxygen, Ammonia, Nitrate and ortho-Phosphate were presented in map format whereby the mean or 95th percentile (as appropriate) were presented as coloured dots on maps, with each dot representing a sampling station on a river. Raw data was also presented on CD at the end of each report.

This year, as well as a section on river water quality, there are also sections on lakes, groundwaters and transitional and coastal waters, which incorporate biological assessment as well as the physico-chemical assessments. Including these sections is recognition of the importance of these water types in the water cycle and the desire to produce a more integrated WFD-style report. The individual county reports including summary reports and trend graphs of river quality are available on CD at the end of this report, as is the raw monitoring data.

The report is based on the biological and physico-chemical sampling and analysis of:

- Over 500 river stations on 170 rivers
- 5 lakes (in County Waterford)
- Over 60 groundwaters
- 18 transitional and coastal waters (in Counties Waterford and Wexford)
- 12 bathing water sites (also in Counties Waterford and Wexford)

Details of the ecological status of Irish waters for the period 2007-2009 as required under the Water Framework Directive is available at: [www.epa.ie/downloads/pubs/water/waterqua/Final\\_Status\\_Report\\_20110621.pdf](http://www.epa.ie/downloads/pubs/water/waterqua/Final_Status_Report_20110621.pdf). The review of ecological quality is an on-going process and preparations are underway for assessment of data for the period up to 2012 when the next major report to the EU will be required. This report builds on the information collated to date.

## Pressures

The portions of the three river basin districts covered in this report can be sub-divided into 43 water management units (WMU). These are mapped and tabulated in Chapter 2, and the key point pressures are identified. Most of the key pressures are common to all WMUs – Waste Water Treatment Plants, Surface & Groundwater Abstraction Points for Drinking Water, and Industrial Effluents. Diffuse pressures such as agricultural discharges and discharges from septic tanks also common to all areas.

## Rivers

The river monitoring programme covers the following areas:

- Operational Sites
- Surveillance Sites
- Surface Water Abstraction Sites
- Designated Salmonid Sites

They are monitored for a range of parameters and at suitable frequency, as required by the relevant legislation. Priority substance monitoring on surveillance sites is also carried out and is co-ordinated by the EPA laboratory in Dublin.

Of particular interest in the south-east are phosphate and nitrate levels. Trend graphs, showing the annual median and range for both parameters at seven key river locations are presented and show that while ortho-phosphate is at a fairly stable level in rivers, nitrate levels increased until the late 1990's, and now appear to have stabilised. However, they have stabilised at relatively high levels – average annual phosphate in 45% of river sites, and average annual nitrate in 57% of river sites exceed the thresholds for good status.

Biological monitoring for rivers generally occurs at least once every 3 years. The number of high quality sites in the country has reduced by almost half in the period 1987 to 2008. Only 48 sites in the south-east were classified as high quality (Q4-5) in the period 2007-2009 with just one of these of the highest quality (Q5). When compared to the national statistics, there are fewer unpolluted sites in the south east; 71% of river channel nationally is achieving at least good ecological status, compared with 62% of river channel in the south east. In particular phosphate and nitrate levels are higher in the south east than in other parts of the country, and one of the big challenges will be reducing these nutrient levels to acceptable concentrations in all rivers within the timeframes required by the WFD.

A total of 106 river sites in the southeast have been identified as priority sites for tackling pollution. The majority of problems at these sites are caused by diffuse agricultural and point source municipal pollution. Tackling pollution at these sites, will not only improve river quality, it will have knock-on beneficial effects on lakes and transitional and coastal waters that are fed by these rivers. Targeted local investigations using a variety of methods – for example the Small Stream Risk Score (SSRS) in investigating diffuse pollution – will be the most effective way of identifying and eliminating sources of pollution.

## Lakes

Five lakes were monitored in County Waterford by the EPA. (The eastern shore of Lough Derg is monitored by the Kilkenny Laboratory for North Tipperary County Council and is reported with rivers). These lakes are very shallow – with a mean depth of less than 2m, and are very sensitive to low levels of nutrients. Notwithstanding this, the lakes were classed as being of moderate or poor status – comparing very unfavourably with the national picture where over 45% of lakes are of high or good ecological status. Diffuse pollution is thought to be the main pressure and a reduction in the amount of nutrients reaching lakes via feeder rivers will be key in improving lake quality.

## Groundwater

60 groundwater sites were monitored in the SERBD during 2011. Overall water quality is good, over 97% of groundwater bodies are of good status, compared with 85% nationally. While this is good news, contamination from nitrates, phosphate and faecal coliforms remain a threat. There has been a general reduction in nitrate levels in the period 2001 to 2011, but high nitrate levels remain an issue in the south east. Elevated phosphate levels, resulting from diffuse sources, can also be a source of eutrophication. While agriculture is a major cause of diffuse pollution, the presence of faecal coliforms in over 40% of samples tested indicates that on-site treatment systems, including septic tanks may also be a significant contributor to groundwater pollution.

## Transitional and Coastal Waters

Over 1000 km<sup>2</sup> of transitional and coastal waters in 18 water bodies were monitored in the south-east in 2011. Of these 10 were classified as moderate or worse in terms of ecological status. Bathing waters in the south-east were also monitored during 2011 and all were found to have good or sufficient quality.

## Overall Assessment and Conclusions

Water quality in south-east Ireland is generally of reasonable quality compared with the rest of the country – 62% of rivers, 97% of groundwaters, 45% of transitional and coastal waters, and no lakes meet the target of good or better status as required under the WFD.

Pressures on water bodies in the SE arise from both point and diffuse source pollution. In particular, waters in the south-east are affected by high levels of nutrients – especially nitrates and ortho-phosphate. While ortho-phosphate levels haven't increased in the last thirty years, the levels are still high and need to be reduced to achieve WFD targets. Nitrate levels have come down from the highs of the 1990s, but also remain relatively high, especially compared with national levels.



Almost 20% of river sites in the south-east have been identified as priority sites for tackling pollution – details of these are found in the relevant county reports on disk at the back of this report. Reducing pollution at these sites should also result in improved conditions in lakes, groundwaters, and transitional and coastal waters.

Addressing the sources of pollution – especially diffuse pollution (from agriculture and septic tanks), and understanding the interactions between the various water bodies – rivers, lakes, groundwaters and transitional and coastal waters is vital in retaining and restoring (where appropriate) good status to all water bodies.

Development of the agriculture sector, as detailed in *Food Harvest 2020*, will bring large increases in farm outputs over the coming years. The first of these increases will be in milk production expected in 2016 when the milk quota system is abolished. The challenges of meeting the targets set in the strategy in an environmentally sustainable way are significant. It is important that this sector be developed in such a way that Ireland can also meet its targets under the WFD.

# 1. Introduction

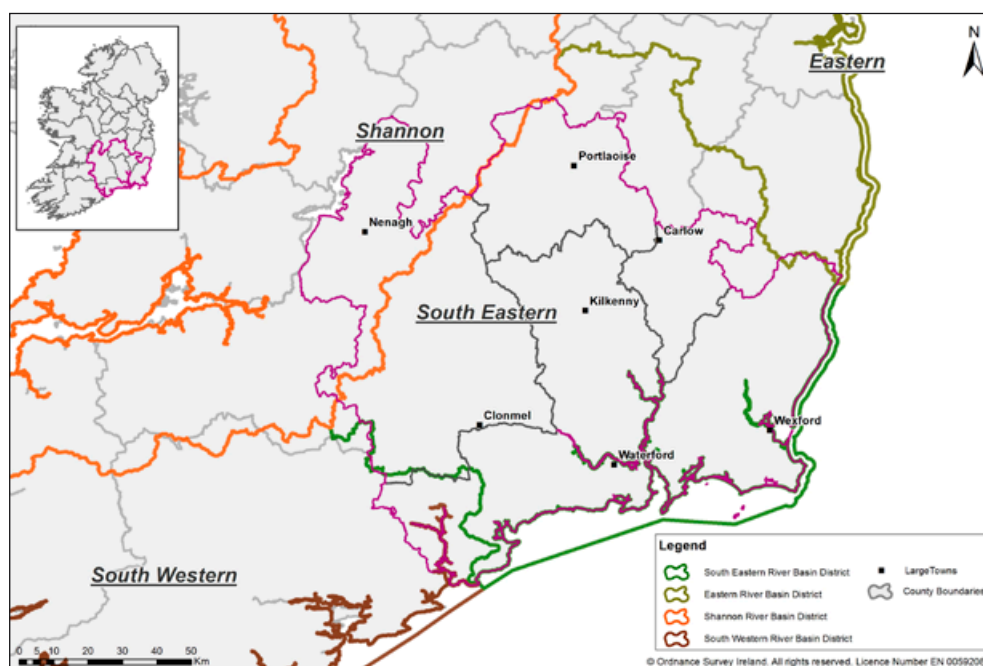
This report is a continuation and an evolution of the series of annual reports on river water quality in the south-east of Ireland that were produced by Michael Neill from the laboratory's establishment in 1979 until his untimely death in 2010.

In 2010 some changes were made to the format of this report to bring it into line with Water Framework Directive (WFD) reporting requirements. This report is a step further along that journey, with the inclusion of information on lakes, groundwaters and transitional waters.

This report is also a sequel to those issued previously by the Environmental Protection Agency (EPA) and reviews the water quality monitoring carried out in accordance with the National Water Framework Directive Monitoring Programme for the period 2009-2011. This programme, which commenced in 2007, covers the principal water body types of Rivers, Lakes, Groundwaters and Transitional (Estuarine) waters. It was set up to address the requirements of Article 10 (1) of the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). These regulations are the National Regulations implementing the requirements of the Water Framework Directive (WFD) 2000/60/EC.

The following map shows the boundaries of the relevant River Basin Districts (RBDs) in the south-east. The area covered by the Kilkenny Regional Inspectorate includes the counties Carlow, Kilkenny, Laois, Tipperary, Waterford and Wexford, and as such it covers some of three RBDs, namely the South Eastern, South Western and Shannon.

**Figure 1.1** *River Basin Districts in South East Ireland*



The WFD aims to maintain the high status of surface and groundwaters, to prevent the deterioration of existing status of waters and to achieve high or good status for those waters by 2015.

More information on the EU Water Framework Directive can be obtained at [www.wfdireland.ie](http://www.wfdireland.ie)

The WFD specifies three types of monitoring – Operational, Surveillance and Investigative. EPA carries out surveillance monitoring but also provides analytical services to Local Authorities in some areas in respect of Operational and Investigative monitoring. Coastal waters are assessed by the Marine Institute while EPA undertakes assessment of Transitional (Estuarine) waters. Investigative Monitoring – aimed at identifying possible causes of pollution and steps required to improve conditions is a responsibility of Local Authorities.

The objectives of Surveillance Monitoring are:

- Supplementing and validating the impact assessment procedure detailed in Annex II of the Directive;
- Assisting the efficient and effective design of future monitoring programmes;
- Assessment of long term changes in natural conditions;
- Assessment of long term changes resulting from widespread anthropogenic activity.

Operational Monitoring aims to:

- Establish the status of those bodies identified as being at risk of failing to meet their environmental objectives;
- Assess any changes in the status of such bodies resulting from the Programme of Measures.

The first full period for the assessment of water quality covers 2009-2015. This report aims to present an assessment of progress towards meeting the objectives of the WFD as set out in the respective *River Basin Management Plans* [http://www.wfdireland.ie/docs/1\\_River Basin Management Plans 2009 - 2015/](http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/).

## Change in Report Format

The format of this report differs from previous years in that it is more focussed towards the objectives of the WFD. Changes from previous formats include:

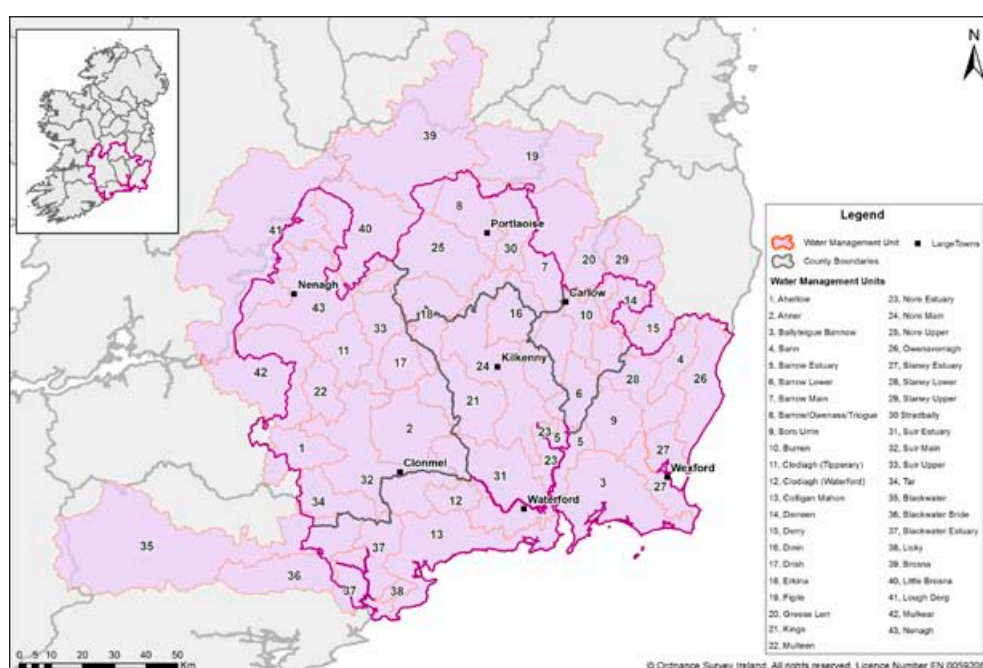
- A greater emphasis on assessing compliance with the Water Framework Directive, and in particular the reporting requirements of the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009) and other relevant legislation.
- Focus on pressures at Water Management Unit (WMU) level as defined in the WFD River Basin District Management Plans.
- Data for several key parameters are presented in map format whereby the mean values are presented as coloured dots on maps, with each dot representing a sampling station on a river.
- Graphical presentation of parameter quality and trends with spatial and temporal assessment where sufficient data stations permit.
- County reports, analytical data and supporting text are now provided on an accompanying disc at the back of this report.

## 2. Summary of Pressures

The area covered in this report relates to some or all of three River Basin Districts (RBDs), the South-Eastern, the South-Western and the Shannon. Each RBD is subdivided into Hydrometric areas and divided again into Water Management Units (WMUs).

The area covered and WMU locations are shown in the following map:

**Figure 2.1** *Water Management Units in South-East Ireland*



Tables 2.1, 2.2 and 2.3 summarise the key point pressures in the WMUs in the Southeast, Southwest and Shannon RBDs. More detailed information may be found on the [www.wfdireland.ie](http://www.wfdireland.ie) website and in the river basin management plans of the relevant RBD.

Many of the point pressures are common to all WMUs – for example there are waste water treatment plants in almost all WMUs, and abstraction points for drinking water in the majority of WMUs. Industrial effluents, landfills and section 4 licences area all point source pressures as well.

The south-east is predominantly rural and diffuse pollutions from agriculture and septic tanks are also significant contributory pressures which are expected to grow in the coming years. *Food Harvest 2020*, which was developed as a cohesive road map for the agriculture, fisheries and forestry sector to build capacity, predicts the value of primary output in this sector will increase by 33% from the 2007-2009 average. It should be noted that environmental sustainability is stated as a key underlying principle of *Food Harvest 2020*, and therefore there will be challenges for the agriculture sector to deliver the projected increases in output in a manner that does not prevent Ireland from meeting its objectives under the WFD.

**Table 2.1** *South-Eastern RBD – Main Pressures on WMUs*

WMU Name and Number		Key Pressures				
		WWTP	SW/GW Abs	Landfill	IPPC	Other
1	Aherlow	Tipperary Town, Lisvernane		Donohill	Tipperary Co-op	
2	Anner	Killenaule, Fethard			Willamette, National Proteins	
3	Ballyteigue Barrow	Taghmon, Arthurstown, Duncannon, Wellingtonbridge	Mulmontry for Taghmon WS, Owenduff for Wexford S Reg WS			
4	Bann	Camolin, Ferns	Bann for Gorey WS		Irish Country Meats	
5	Barrow Estuary	New Ross, Campile	Pollmounty for New Ross WS		Green Biofuels	
6	Barrow Lower	Borris, Graiguenamanagh	Duiske for Graiguenamanagh WS		Richard Keenan & Co.	
7	Barrow Main	Paulstown, Ballylinan, Portarlinton, Goresbridge	Barrow for Portarlinton WS	Powerstown	SIAC Butlers Steel Ltd	
8	Barrow Owenass Triogue	Mountmellick, Portlaoise	Owenass for Mountmellick WS, Kilminchy GW for Portlaoise	Kyletalesha	DIS Enbi Seals Ltd, Ballyfin Sawmills Ltd	
9	Boro Urrin	Clonroche				
10	Burren	Tinryland	Burren for Carlow Central WS			
11	Clodiagh (Tipperary)	Borrisoleigh, Upperchurch, Drombane, Drom Village	Rathmoy GW for Borrisoleigh and Bouladuff PWS			
12	Clodiagh (Waterford)	Clonea Power	Clodaigh for E Waterford WS			Disused tannery at Portlaw
13	Colligan Mahon	Annestown, Ardmore, Dungarvan	Mahon for Kill/Annestown WS		Radley Engineering, Waterford Joinery	Reedbed treatment system in Dunhill Village
14	Derreen	Hacketstown	Derreen for Hacketstown WS		Kepak Hacketstown	
15	Derry	Clonegal				
16	Dinin	Castlecomer, Clough/Moneenroe, The Swan	Dinin and Muckalee for Kilkenny City WS		Flemings Firecalys	
17	Drish	Littleton, Two-mile Borris	Horse and Jockey, Two Mile Borris GW		Bord na Móna Fuels	Composting Facility, Hi Volt Waste Facility

WMU Name and Number		Key Pressures				
		WWTP	SW/GW Abs	Landfill	IPPC	Other
18	Erkina	Durrow, Johnstown, Rathdowney, Urlingford			Galmoy Mine, Meadow Meats	
19	Figile	None in SE region				
20	Greese Lerr	Palatine				
21	Kings	Callan, Kells, Stonyford				
22	Multeen	Dundrum	Multeen for Dundrum WS		Dundrum Sawmills	
23	Nore Estuary	Inistioge	Clodiagh for Inistioge WS			
24	Nore Main	Ballinakill, Ballyragget, Bennetsbridge, Freshford, Thomastown, Kilkenny	Nore for Kilkenny City WS	Dunmore	Glanbia, E. Smithwick, Roadstone	
25	Nore Upper	Abbeyleix, Ballyroan, Mountrath			Coolrain Sawmills, Randstone Ltd	
26	Owenavorrach	Gorey, Ballycanew			Ballywalter Farms	
27	Slaney Estuary	Castlebridge, Piercetown, Ballymurn	Sow for Sow Regional and Wexford Town WS	Killurin	Carl Zeiss, Wexford Creamery	
28	Slaney Lower	Bunclody, Enniscorthy	Slaney for Enniscorthy WS		Slaney Foods, Irish Country Meats	
29	Slaney Upper	Rathvilly, Tullow				
30	Stradbally	Stradbally				
31	Suir Estuary	Fiddown, Grangemockler, Mooncoin, Piltown, Portlaw, Waterford City	Blackwater and Pollanassa for Mooncoin Reg. WS, Lingaun for Carrick-on-Suir WS, Ballyscanlon and Carrigavantry Lakes for Tramore WS	Kilbarry	ABP Proteins, HP Chemie, PPI Adhesives, IVAX, Cherry's Brewery, Honeywell	
32	Suir Main	Cahir, Cashel, Clonmel	College and Springmount for Galtee Reg. WS, Glenary and Poulavanogue for Clonmel WS, Gurtnapisha and Mullinbawn for Fethard Reg. WS		MSD, Medite, Fair Oak Foods, John Ronan & Sons, Bulmers, ALZA	



WMU Name and Number	Key Pressures				
	WWTP	SW/GW Abs	Landfill	IPPC	Other
<b>33</b> Suir Upper	Templemore, Templetohy, Holycross, Clonmore, Loughmore	Templemore GW, Thurles GW & SW		Lisheen Mine	
<b>34</b> Tar	Burncourt	Burncourt for Burncourt/Ballyporeen WS, Glengalla for Ardfinnan Reg. WS		Bramblemore Ltd (Pig Producers)	

**Table 2.2** *South Western RDB – Main Pressures on WMUs*

WMU Name and Number	Key Pressures				
	WWTP	SW/GW Abs	Landfill	IPPC	Other
<b>35</b> Blackwater	Lismore	Glenakeefe and Owenashad for Lismore WS			
<b>36</b> Blackwater Bride	Tallow	Bride for Tallow WS			
<b>37</b> Blackwater Estuary	Cappoquin, Piltown			Cappoquin Chickens	
<b>38</b> Lickey		Lickey for Ardmore WS			

**Table 2.3** *Shannon IRBD – Main Pressures on WMUs*

WMU Name and Number	Key Pressures				
	WWTP	SW/GW Abs	Landfill	IPPC	Other
<b>39</b> Brosna	Clonaslee	Clodiagh for Clonaslee WS			
<b>40</b> Little Brosna	Roscrea	Little Brosna for Roscrea		Rosderra Irish Meats, Ashbourne Meats	
<b>41</b> Lough Derg	Ballina, Portroe, Newtown, Dromineer, Terryglass, Puckane, Lorrha	Lough Derg for Nenagh WS			
<b>42</b> Mulkear	Newport, Rear Cross	Newport for Newport Environs WS			
<b>43</b> Nenagh	Nenagh, Cloughjordan, Borrisokane	Borrisokane GW, Cloughjordan GW	Ballaghveny	AIBP Nenagh, Arrabawn Co-op, Toomevara Farms, Gleeson Pig Farm	Old Silvermines Complex located in this WMU

## 3. River Water Quality

### 3.1 Sampling locations

Physico-chemical and biological monitoring under the Water Framework Directive is being undertaken at over 500 stations in 170 rivers in the south-east. These sites were selected as representative of clean waters near the source of the river, or spring, and also at regular locations along the river, where sampling is convenient, safe and representative of the river in general. Sites were also selected downstream of discharges that might impact on the general quality of the river.

A full list of these stations is available in Appendix 5.

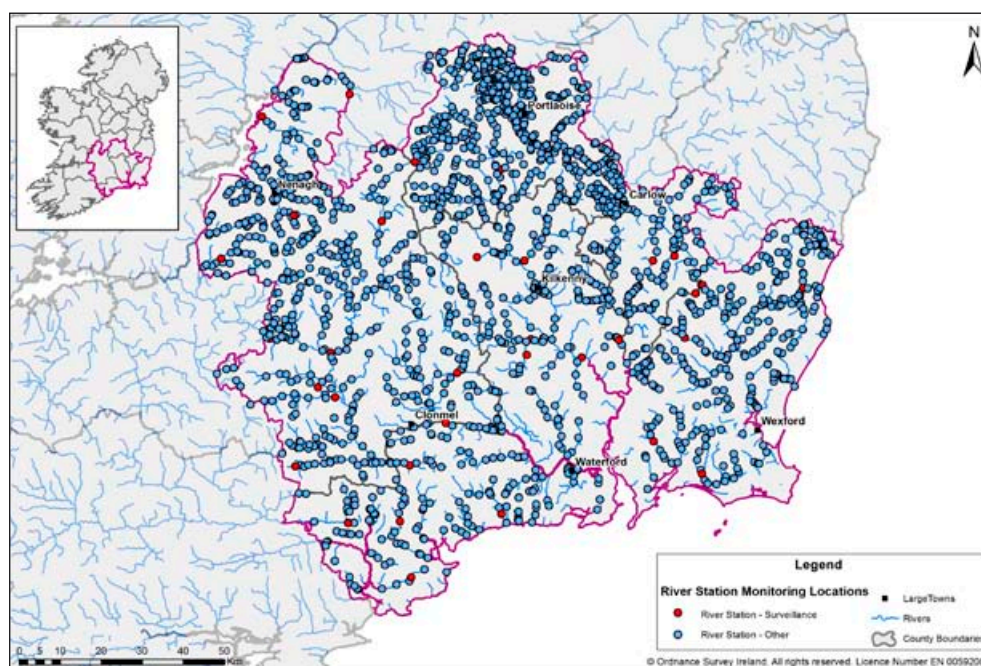
Physico-chemical monitoring is carried out on each river site between 4 and 12 times per year, depending on the legislative requirements. This can take the form of surveillance monitoring which is undertaken by EPA to determine long term variations in water quality; or operational or investigative monitoring which is undertaken by (or on behalf of) Local Authorities for the purposes of assessing the impacts of localised pollution sources.

Biological monitoring is generally carried out once every 3 years at each site.

The map in Figure 3.1 indicates the locations of the river monitoring sites in the south-east.

Further information on the design and operation of National Monitoring programmes is available from the EPA website at: <http://www.epa.ie/downloads/pubs/water/other/wfd/>

**Figure 3.1** *River Monitoring Points in South-East Ireland 2011*



## 3.2 Physico-Chemical Monitoring of Rivers

The rivers monitored by the Kilkenny laboratory are monitored for one or more of the following reasons:

- Operational Sites
- Surveillance Sites
- Surface Water Abstraction Sites
- Designated Salmonid Sites
- Others

Operational Sites require the following monitoring: temperature, dissolved oxygen, pH, conductivity, hardness, colour, alkalinity, ortho-phosphate, TON, nitrate, nitrite, ammonium, chloride and BOD.

Surveillance sites require these parameters as well as priority substances (including certain metals and organic compounds). Surface water for the Abstraction of drinking water sites require most of the physico-chemical parameters required for operational sites, as well as metals and total coliforms and *E. coli*. Designated Salmonid sites require the operational suite, as well as suspended solids, free ammonia, copper and zinc. Other sites are dealt with as problems arise.

In previous reports water quality had generally been characterised on a broadly defined scale of “Unpolluted”, “Moderately Polluted at times” and “Seriously Polluted at times” depending on the concentrations of nutrients such as ortho-phosphate, ammonium, TON, and reference to the biological Q-value and BOD. This approach will be continued for now and the summary of water quality using this approach can be found in Appendix 4.

The Water Framework Directive does not accommodate such an approach and chemical data is now assessed against its compliance with the criteria set out in the “European Communities Environmental Objectives (Surface Water) Regulations 2009” (S.I. 272 of 2009 [www.environ.ie/en/Legislation/Environment/Water/FileDownload,20824,en.pdf](http://www.environ.ie/en/Legislation/Environment/Water/FileDownload,20824,en.pdf)). The key nutrients for rivers and estuaries, namely o-phosphate and nitrate are discussed in greater detail in the following sub-sections.

Information on the main physico-chemical parameters can be found in Appendix 2, and raw data is available on disk at the back of this report.

### 3.2.1 Phosphate in Rivers

River water quality monitoring has shown increased eutrophication in most Irish rivers since the 1970s and this is caused fundamentally by increased phosphorus run-off from agricultural land and farmyards as well as from municipal and industrial effluent discharges (McGarrigle *et al.*, 2010).

Eutrophication in surface waters arises from the marked increase in nutrient supply leading to excessive growth of algae or other plants. Phosphorus (P) is usually the limiting nutrient for plant growth in freshwaters. P is an essential element for life and is non-toxic. Plants require P (along with other nutrients) for growth and a small amount of P in surface waters is natural.

However if natural levels of P are exceeded, there can be excessive plant growth leading to high levels of photosynthesis (and oxygen production) during the day, followed by excessive respiration (and oxygen consumption) during darkness. This diurnal variation leads to a serious drop in oxygen levels at night which can have detrimental effects on water quality of the river. This in turn can disturb the ecological balance of the river leading to shifts in species composition, food-chain effects, increases in toxic algal blooms and collapse of populations of sensitive fish and other species.

Ortho-phosphate is a very dynamic biologically active substance and is freely removed from water by aquatic plants and algae, especially during the spring/summer/autumn period. Consequently increases in eutrophication are not always evident from the analyses of o-phosphate in river water samples. In many instances increased eutrophication is more evident from the biomass of plant and algae and from the effects of plant respiration and photosynthesis on dissolved oxygen and pH.

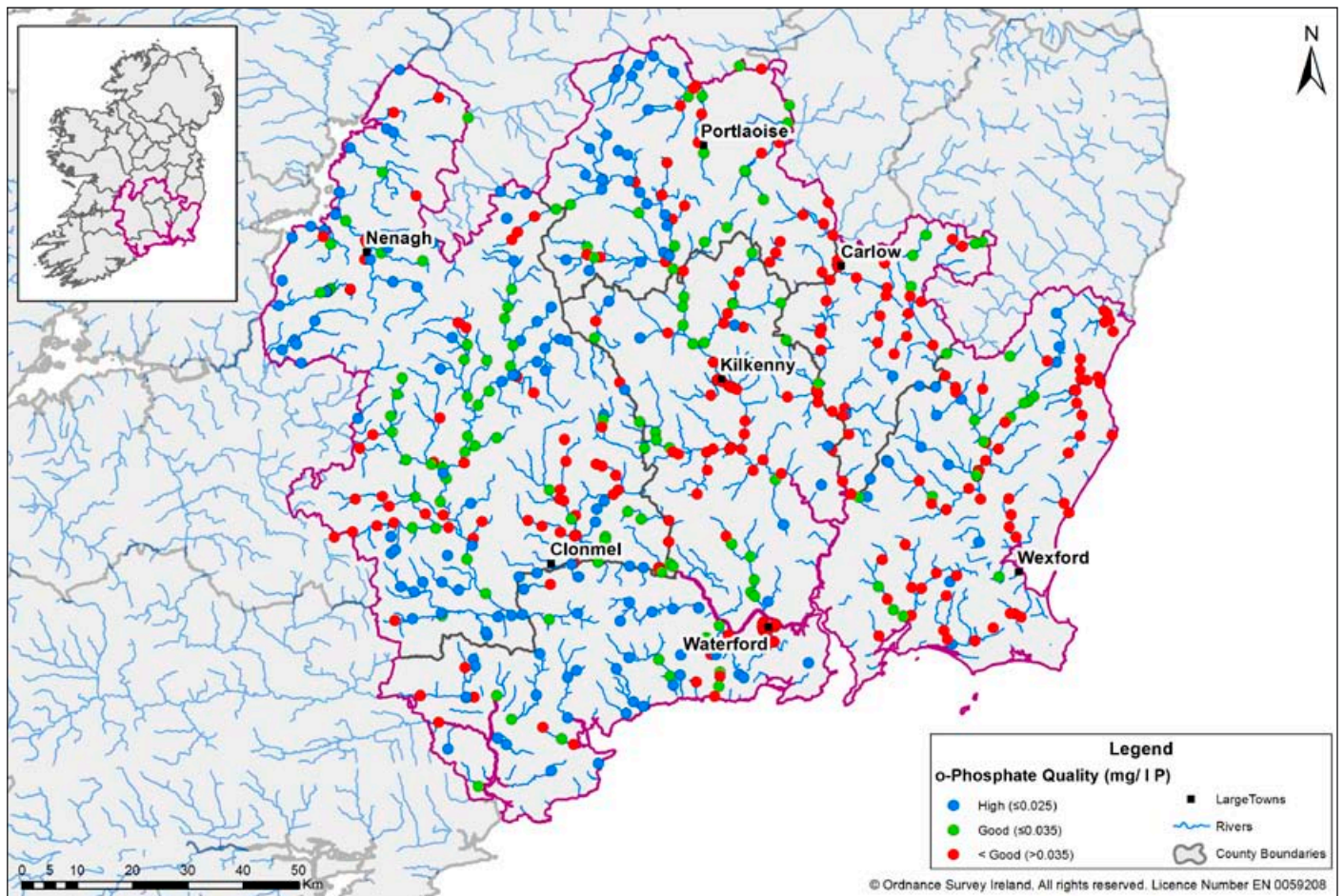
Much of the P added to soil in the form of agricultural fertiliser or animal slurry tends to accumulate in the top inch of soil and the surface soil layer can easily become saturated with P. Water can leach significant amounts of P from surface soil, especially during the early stages of heavy rainfall events. The higher the soil P content, the higher the potential for loss of P to waters (Tunney *et al.*, 2000). Rivers also receive direct discharges of wastes that contain various forms of P – for example sewage, animal slurry, industrial effluents, landfill leachate, etc.

A summary of the relevant ortho-phosphate standard is as follows (as mg/l P):

Water Framework Directive Inland Surface Waters S.I. 272 of 2009		Surface Water Abstraction – A1 S.I. 294 of 1989
Annual Mean	MAC	
0.035 good 0.025 high	0.075 good 0.045 high	0.22

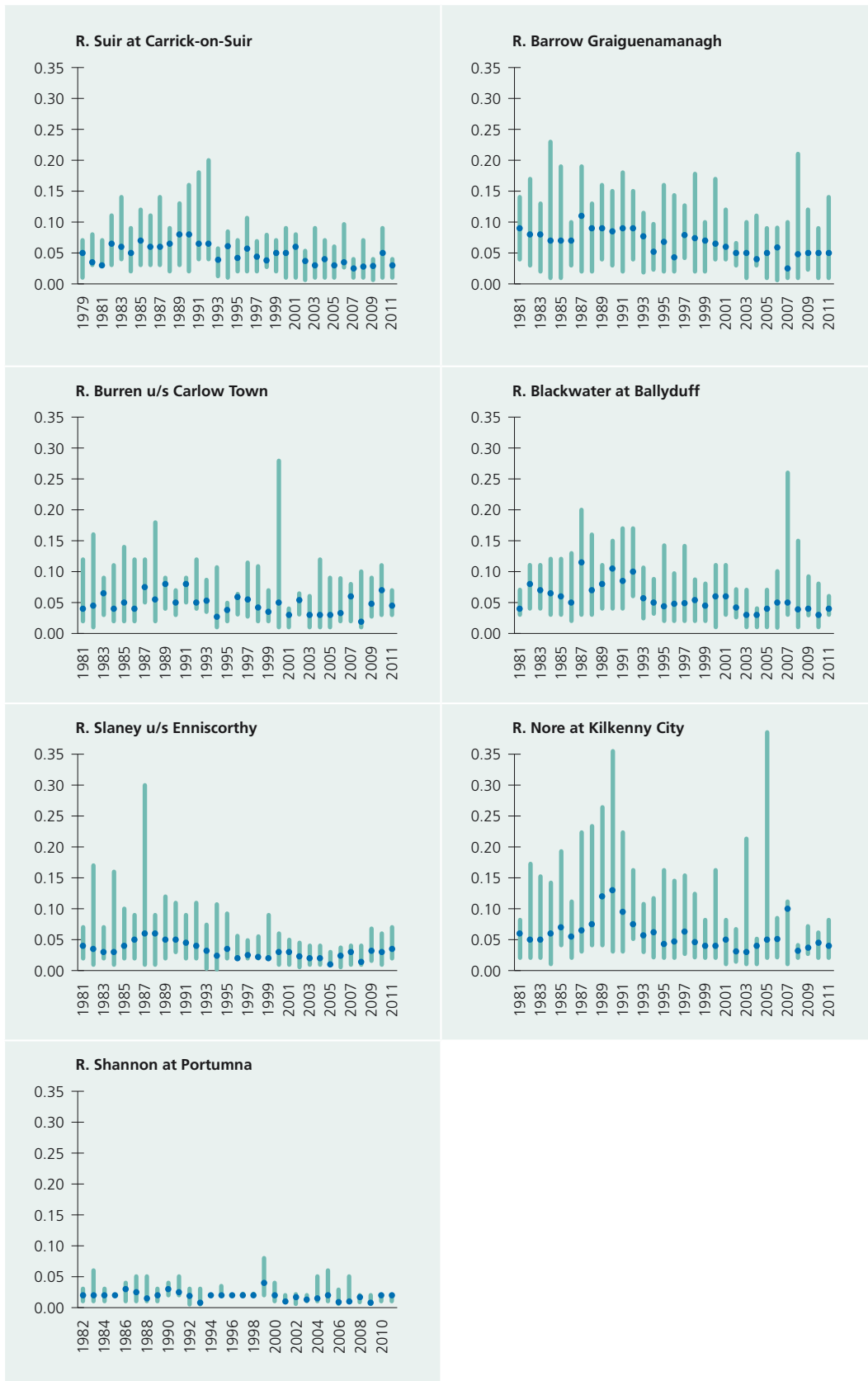
Figure 3.2 shows the annual average o-phosphate concentration in south-east rivers in 2011. While o-phosphate levels are fairly stable, they are high – 45% of river sites in the south-east had an average concentration >0.035mg/l P, i.e. status was less than good (based on the standard set in the Surface Water Regulations).



**Figure 3.2** Annual average o-Phosphate in South-east Rivers in 2011

From a long-term monitoring perspective, graphs 3.1-3.7 below summarise the annual range and median o-phosphate concentrations at seven representative river sampling locations in the south east region since 1979. These graphs indicate that while there have been fluctuations, the overall levels of o-phosphate recorded in river water samples have not increased significantly over the 30-year period. However, levels of o-phosphate in the south east have remained higher than in other parts of Ireland due to the large areas of land under tillage.

**Graphs 3.1-3.7** Annual median and range for o-Phosphate in rivers in South-East Ireland from 1979 to present





### 3.2.2 Nitrate in Rivers

**EU Directives and Nitrate Standards for Water:** The EU Directive on the quality of water for human consumption (Council Directive 98/83/EC) specifies a maximum admissible concentration of 11.3 mg/l N for nitrate (= 50 mg/l as NO<sub>3</sub>) and also sets out a guide level of 5.65 mg/l N (= 25 mg/l as NO<sub>3</sub>) – the lower guide level is not mandatory but should nonetheless be aimed for as a quality objective.

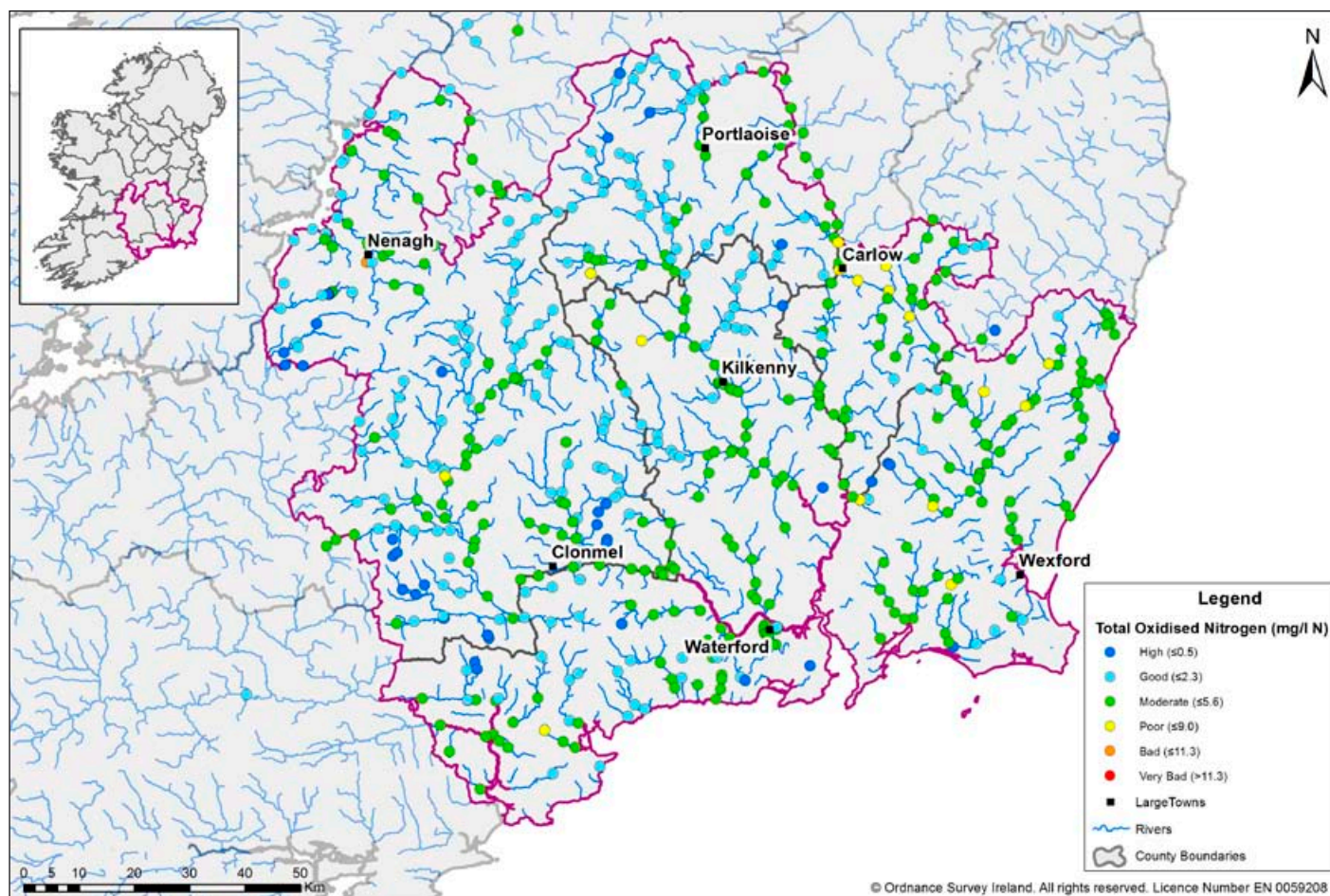
Normal treatment processes for drinking water do not reduce the nitrate content and consequently, the limits above are also specified in the EU Directive on the Quality of Surface Water Intended for the Abstraction of Drinking Water (Council Directive 75/440/EEC). It is considered that all river waters in southeast Ireland should meet these standards therefore these are the criteria that are used here to assess river nitrate levels.

The EC Directive regarding the Protection of Waters from Pollution caused by Nitrate from Agricultural Sources was introduced in 1991 because of concern for nitrate concentrations in surface and groundwaters (Council Directive 91/375/EC). Further regulations introduced in 2006 allow for the control of animal stocking rates, farmyard management, and fertilisers and slurry application rates for various crops (S.I. No. 378 of 2006).

**Factors Affecting River Nitrate Concentrations:** The ploughing of agricultural land is by far the principal factor affecting the concentrations of nitrate in rivers. Research by several groups (Neill 1989, HMSO, 1986 & Ryan *et al.*, 1995) compared the nitrogen loss from ploughed and unploughed land and found losses from the former significantly higher than from the latter.

In its 2004 Signals Report, the European Environment Agency states that *“Nitrate concentrations in rivers are linked to the proportion of arable land in the upstream catchment: ... In 2001, nitrate levels in rivers where arable land covers more than 50% of the upstream catchment area were three times higher than in catchments with arable land cover of less than 10%”*. The highest annual river nitrate concentrations normally occur in the months of January/February with the lowest concentrations in July/August.

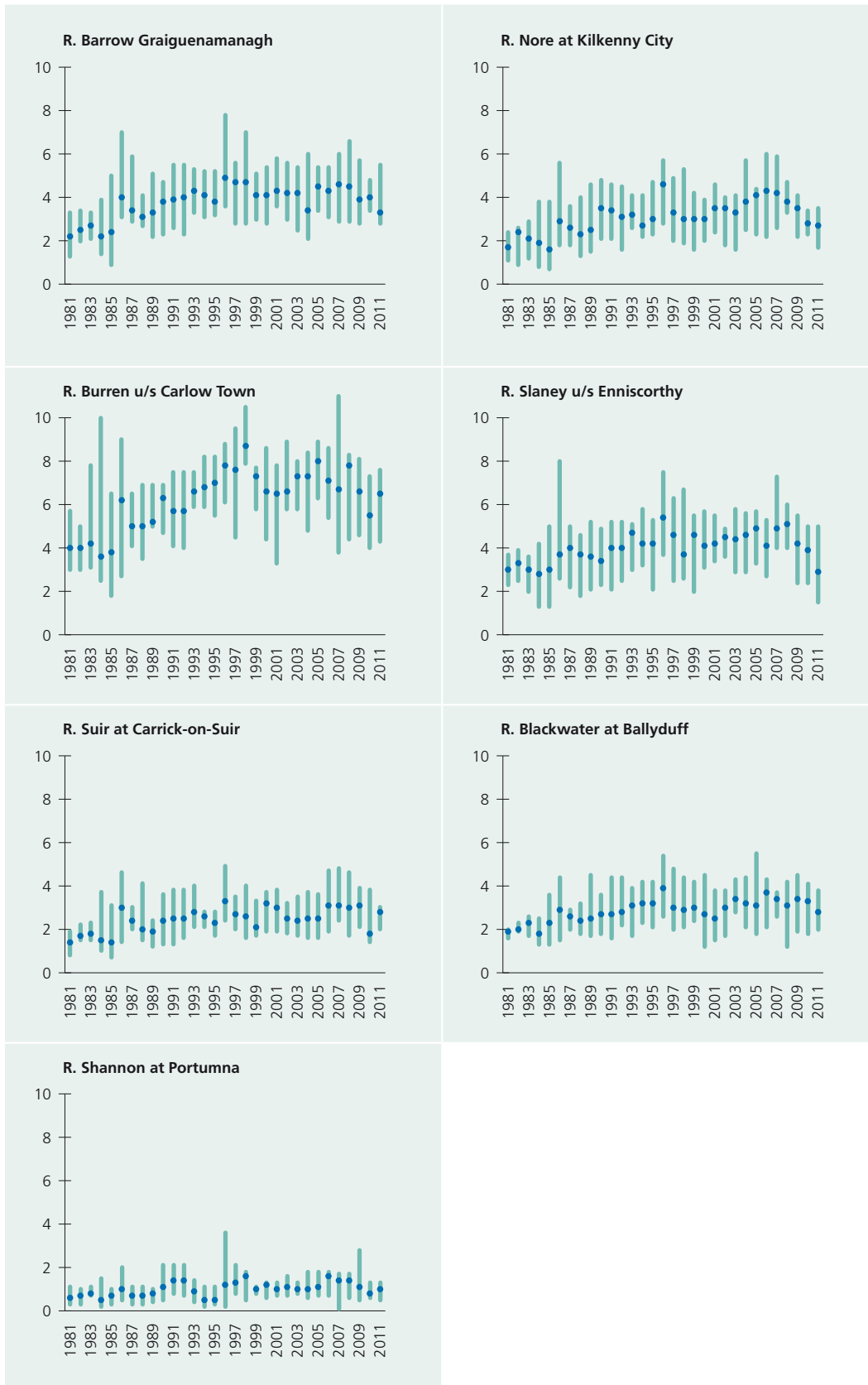
Figure 3.3 shows the annual average nitrate concentration in south-east rivers in 2011. Of the 553 stations monitored, only 43% were high or good, 57% were moderate (based on the nitrates directive classification of water quality) (Figure 3.3).

**Figure 3.3** Annual average Nitrate in South-east Rivers in 2011

**Long Term Trends for Nitrates in River Waters in the South East:** The graphs below show the annual range and annual median nitrate concentrations at representative river sampling locations since 1979. In general, the southeast has the highest river nitrate levels nationally. The sampling locations shown in the graphs are selected so as to represent each of the main river catchments in the region; the Burren is also included because it has one of the highest river nitrate concentrations nationally. The graphs show the long-term trends and indicate that the nitrate concentrations in all of the river catchments have increased since 1979, however levels appear to have stabilised since the late 1990s.

Nitrate concentrations in rivers in the southeast region are generally below the 11.3 mg/l N standard, however during winter many rivers exceed the 5.65 mg/l N guide level. The highest nitrates are generally associated with tillage areas (e.g. North County Carlow rivers Aghalona, Burren and Lerr – but nitrates are also elevated in rivers in other areas of the region).

**Graphs 3.8-3.14** *Nitrate in rivers in South-East Ireland from 1980 to present*



### 3.2.3 Salmonid Rivers in the Region

The objective of this designation type is the maintenance of water quality for salmon and trout freshwater species and is legally backed by the European Communities (Quality of Salmonid Waters) Regulations, S.I. No 84 of 1988.

The 1988 directive defines freshwaters as being waters capable of supporting Salmon (*Salmo salar*), Trout (*Salmo trutta*), Char (*Salvelinus*) and Whitefish (*Coregonus*) and are to be designated as Salmonid waters.

The local authorities in the South-East region are responsible for the monitoring of salmonid rivers, and EPA Kilkenny carries out this work on their behalf. The rivers that are designated as salmonid in the South-East are the Aherlow, Blackwater, Bride, Nore and Slaney, and they require monitoring on a monthly basis.

#### Compliance:

474 samples were taken and analysed according to the salmonid regulations in 2011. There was 100% compliance with the following parameters: Temperature, pH, Ammonia, Non-ionised Ammonia, Copper and Zinc. The list of exceedances and their locations is given in table 3.1. All are relatively minor.

**Table 3.1** *Exceedances of Salmonid Regulations in 2011 in South-East Ireland*

River Name	River Station	Parameter	Limit	No. of Failures
Slaney	12S02-1200	BOD	5 mg/l O <sub>2</sub>	1
Slaney	12S02-1400	BOD	5 mg/l O <sub>2</sub>	2
Nore	15N01-0300	Dissolved Oxygen	50% of samples ≥ 9 mg/l O <sub>2</sub>	1
Nore	15N01-1400	Nitrite	0.05 mg/l N	1
Nore	15N01-2300	BOD	5 mg/l O <sub>2</sub>	1
Blackwater	18B02-3000	Suspended Solids	Annual Ave >25 mg/l	1
Bride	18B05-1000	Suspended Solids	Annual Ave >25 mg/l	1

### 3.3 Biological Monitoring of Rivers

#### Biological Monitoring

This is generally carried out on a three year cycle. The freshwater reaches of rivers and streams are surveyed from an upper 'survey limit' to their confluences with other rivers or to their tidal limit. The survey limit is a point in the headwaters above which biological sampling is impracticable, usually because of lack of flow. Sampling sites are typically located at 5 km intervals with extra stations located in some reaches to reflect better the effects of point discharges or other known or potential pollution sources. In order to determine the channel lengths in the various water quality classes it has been necessary to interpolate conditions between the individual sampling points: this procedure has been carried out in a systematic and standardised fashion having regard to typical or expected patterns of water quality recovery in rivers affected by waste discharges. Where possible chemical and biological sites coincide.

#### Biological Assessment

In the presence of pollution, characteristic and well-documented changes are induced in the flora and fauna of rivers and streams. Particularly well documented are the changes brought about by organic pollution in the macroinvertebrate community i.e., the immature aquatic stages of aerial insects (mayflies, stoneflies etc.) together with Crustacea (e.g. shrimps), Mollusca (e.g. snails and bivalves), Oligochaeta (worms) and Hirudinea (leeches). For the purposes of the EPA assessment procedure benthic macroinvertebrates have been divided into five Indicator Groups.

Relationships between water quality and macroinvertebrate community structure are usually described by means of a numerical scale of values. The EPA scheme of Biotic Indices or Quality (Q) Values and its relationship to WFD status is set out in the table. Where a toxic effect is apparent or suspected the suffix '0' is added to the biotic index (e.g. Q1/0, Q2/0 etc) and attention is sometimes drawn to siltation or atypical effects by appending an asterisk to the biotic index (e.g. Q1\*, Q2\* etc). The Q-rating assessment has been adapted to meet the requirements of the WFD and to ensure it is comparable with methods used in other EU countries.

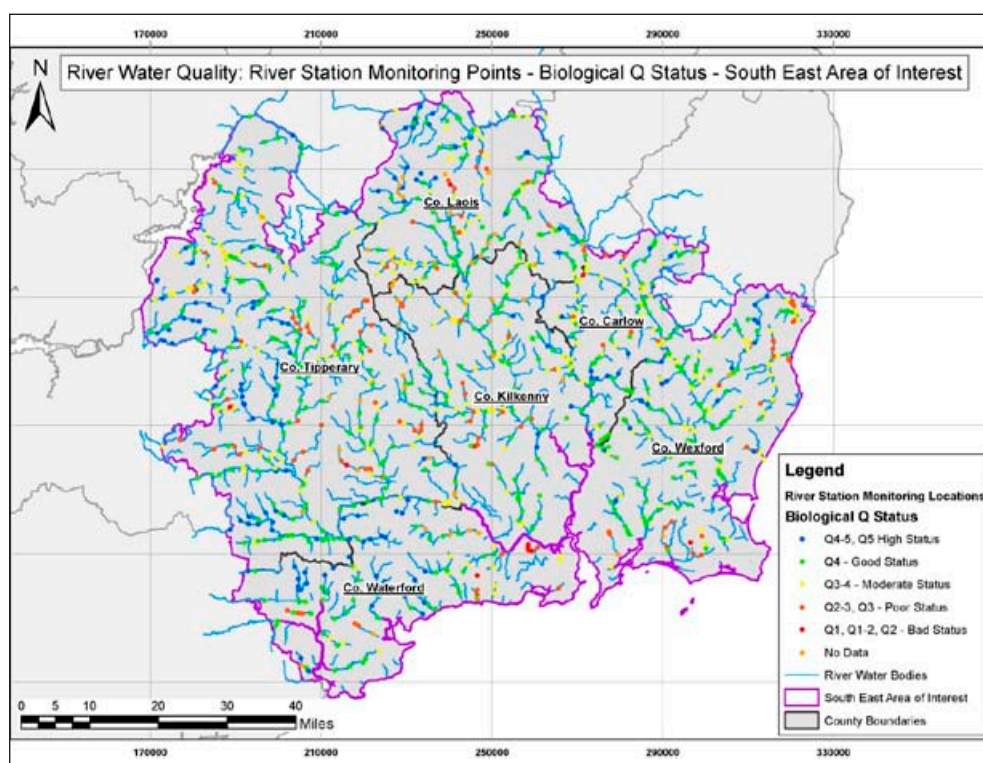
Q-Value	WFD Status
5,4-5	High
4	Good
3-4	Moderate
3	Poor
2-3	Poor
2	Bad
1-2	Bad
1	Bad



In the overall assessment for WFD status at surveillance sites, in addition to macroinvertebrates, other biological elements, i.e. plants (macrophytes), algae (including diatoms) and fish as well as hydromorphological and chemical criteria, are taken into account.

Fig. 3.4 provides the most recent WFD biological classification of rivers in the south east. It shows that 62% of sites monitored are of Good or High status, with 10% of poor status or worse. Q-value data is available at <http://www.epa.ie/qvalue/webusers/>.

**Figure 3.4** *Biological Classification of Rivers in the South-East region*



### High Quality Sites

Nationally the percentage of high quality (Q5 and Q4-5) sites almost halved in the 21 years between 1987 and 2008 with those attaining Reference Condition (Q5) down to two per cent. The number of high quality sites in the south-east region in the period 2007-2009 are shown below:



County	Sites
Carlow	3
Kilkenny	3
Laois	9
Tipperary North	6
Tipperary South	6
Waterford	13
Wexford	8

In the 2008-2010 period, 48 high quality sites were recorded in the parts of Hydrometric Areas 11, 12, 13, 14, 15, 16, 17, 18 and 25, relevant to the above counties. Just one of these, the Glenakeefe just upstream of its confluence with the Owennashad, was of the highest quality, i.e. Q5.

### Siltation Studies in Rivers

Siltation is thought to be one of the principal causes of decline in Freshwater Pearl Mussel populations in the south east. The Nore sub-catchment upstream of Ballyragget is listed as a protected habitat under the Freshwater Pearl Mussel Regulations (S.I. 296 of 2009). The protected habitats include the main channel of the Nore upstream of Ballyragget, and all of the following tributaries: Ballyroan, Cappanacloghy, Delour, Donaghmore, Erkina, Errill, Goul, Gully, Killeen (Slieve Blooms), Mountrath, Owveg, Rathdowney Stream and Tonet.

Studies have been carried out recently at EPA Kilkenny on the effect of siltation on juvenile salmonid and pearl-mussel habitats. The main aims of the studies were to establish if river substratum dissolved oxygen could be measured directly in the field and to investigate siltation processes particularly in relation to juvenile salmonid and pearl-mussel habitats. The field studies were carried out on pearl-mussel rivers in the south-east with emphasis on the River Nore (Counties Laois and Kilkenny) which is home to the last surviving population of the hard-water form (ecophenotype) of *Margaritifera margaritifera*.

The study had effectively two linked phases with the following objectives:

1. To measure silt accumulation along the River Nore during base flow conditions and examine the relationship between turbidity and suspended solids measurements.
2. To test a method of directly measuring dissolved oxygen in river substrata which to date has been done by proxy, i.e. by taking redox potential readings to indicate oxidation of sediments, or by extracting water and then analysing the samples.

The field studies were carried out in 2010 and 2011 and are due to be reported on in Summer 2012.

### 3.4 Summary

Approximately 550 sites on 170 rivers in the south-east were monitored during 2011. Not all of the sites were of good or high status – 106 river sites have been identified as priority sites for tackling pollution. The counties and number of priority sites are listed below and more details of the sites in each county are provided in the individual country reports which form an appendix to this report.

County	No of Priority Sites
Carlow	8
Kilkenny	10
Laois	15
N Tipperary	26
S Tipperary	17
Waterford (City & County)	6
Wexford	22

A continued focus on investigative monitoring should identify the causes of pollution at these sites and allow for more targeted measures to be implemented to address the causes of pollution.

Compared with the national average, the south-east seems to be performing poorly in general. For example in the period 2007-2009, 42% of water bodies in the south-east were of good or high status, compared with 52% nationally. Biological monitoring also indicates the relative lack of high-quality sites, with just one in the south-east.

As discussed earlier, o-phosphate levels in nearly half of the river sites, and nitrate levels in nearly 60% of sites were less than good. The projected increase in primary output from the agriculture sector under *Food Harvest 2020*, will prove challenging in the context of meeting the objectives of the WFD within the required timeframes.

As well as having effects on the ecological status of rivers themselves, nutrient levels in rivers also affect the quality of the lakes and transitional and coastal waters they feed. A reduction in the total amount of nutrients delivered to lakes and transitional and coastal waters from rivers is a key focus of the WFD programme of measures.

## 4. Lake Water Quality

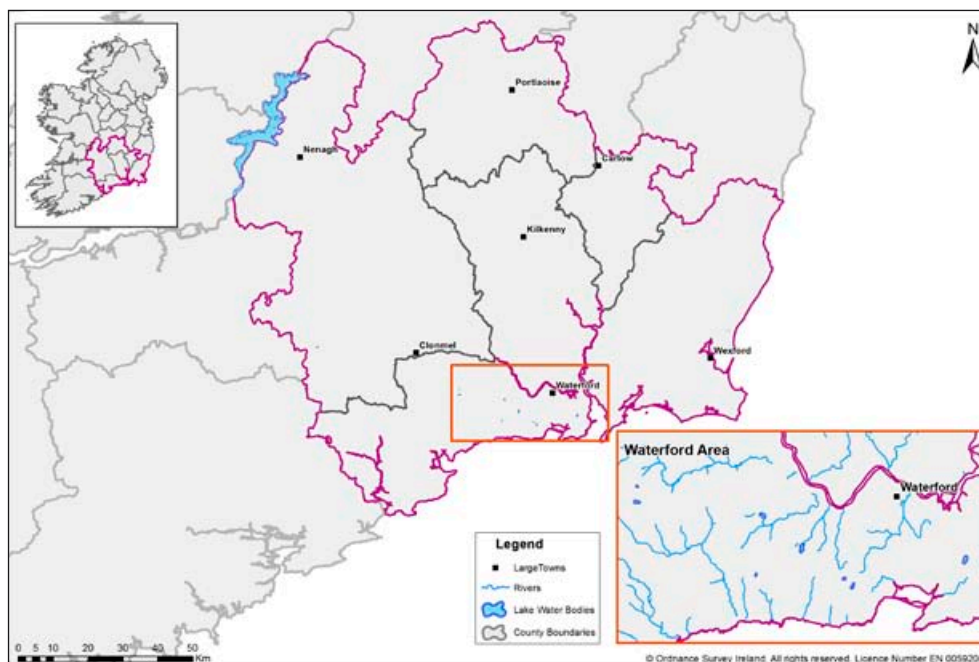
### 4.1 Physico-Chemical & Biological Monitoring

There are very few lakes in the south-east of Ireland. Of approximately 200 lakes assessed for WFD status in the period 2007 to 2010, only 5 were in the South-Eastern RBD.

Three lakes and two reservoirs – Ballyscanlon, Ballyshunnock, Belle, Carrigavantry Reservoir and Knockaderry Reservoir are on the WFD lake monitoring programme in the South Eastern River Basin District. They are sampled for the biological parameters – macrophytes (with the exception of Ballyscanlon), and phytoplankton (chlorophyll). They are also monitored for the following physico-chemical parameters: alkalinity, total ammonia, calcium, chloride, chlorophyll, conductivity, dissolved oxygen, dissolved organic carbon, magnesium, nitrate, nitrite, pH, potassium, transparency, silica, sodium, sulphate, temperature, TON, total phosphorus and true colour. The data is available in the appendices on disk at the back of this report.

These lakes and reservoirs are also SW abstraction points providing water to East Waterford, Tramore and Dunmore East, and in addition to the physico-chemical monitoring, they are also monitored for metals, total coliforms, *E. coli* and intestinal enterococci.

**Figure 4.1** *Location of Lakes in South-East Ireland*



## 4.2 Assessment of Water Quality

The chemical and biological parameters are used to determine ecological status which is presented below. In the period 2007 to 2010, all five lakes monitored in the south-eastern RBD were classified as moderate or worse for biological and chemical status.

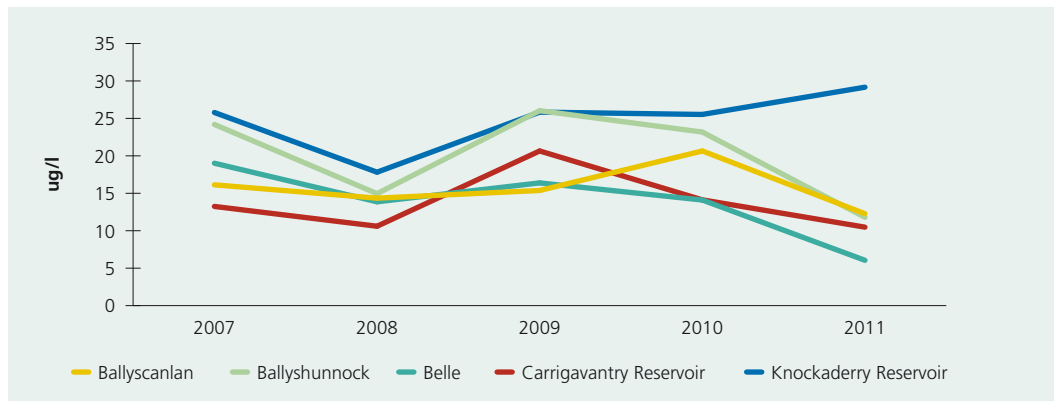
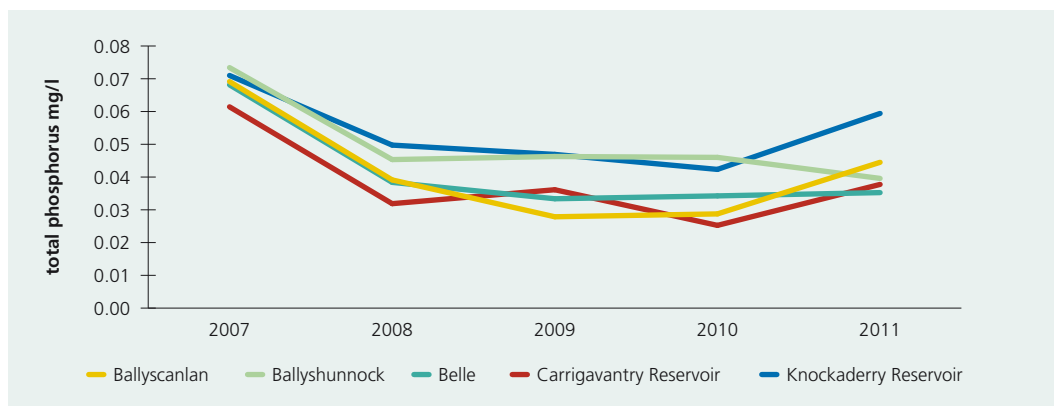
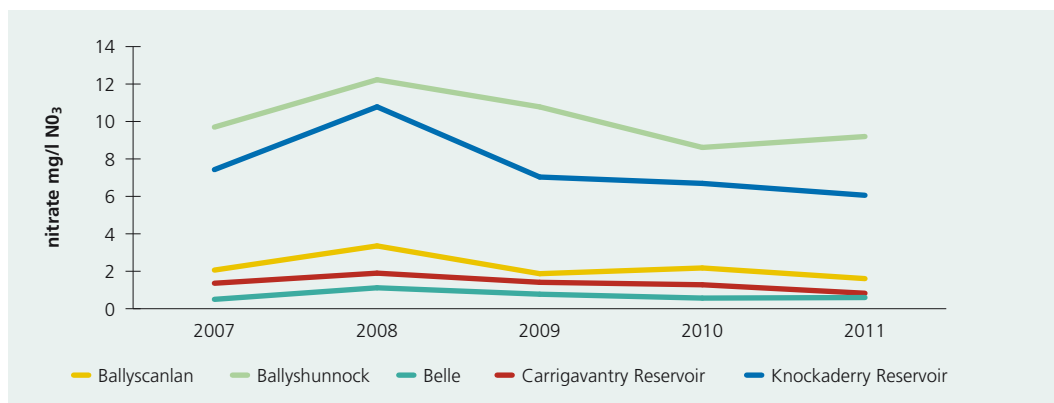
LAKE	2007-2009 Status for BQE	2007-2009 Status for GPC	2007-2009 Ecological Status	2008-2010 Rolling Status for BQE	2008-2010 Rolling Status for TP Status	Ecological Rolling Status 2008-2010
Ballyscanlan	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Ballyshunnock	Moderate	Moderate	Moderate	Poor	Moderate	Poor
Belle	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Carrigavantry Reservoir	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Knockaderry Reservoir	Poor	Moderate	Poor	Poor	Moderate	Poor

**Table 4.1** *Status of Lakes in South-East Ireland*

This compares quite poorly to the national picture, when in the period 2004-2006, almost 92% of lakes nationally (surface area) were good, compared with just 40% in the southeastern RBD. This reflects the relatively high nutrient levels in lakes in the south-east.

Trends in chlorophyll, total phosphorus and nitrate are shown in Figs 4.2-4.4. All lakes, with the exception of Knockaderry Reservoir appear to be exhibiting an overall pattern of reducing annual average chlorophyll levels. It remains to be seen, however, if this is a true trend or a result of climatic or hydrological factors. A downward trend is also observed for nitrates with the exception of Ballyshunnock. Annual average total phosphorus levels appear to be increasing on all lakes after a period of low levels of fluctuation, again with the exception of Ballyshunnock.

The EPA is working towards a set of phosphorus loading limits for individual lakes. Programmes of measures to achieve these limits and bring about further improvements in lake water quality will need to be focussed in particular on nutrient sources.

**Figure 4.2** Average Chlorophyll in South East Lakes 2007-2011**Figure 4.3** Average Total Phosphorus in South East Lakes 2007-2011**Figure 4.4** Average Nitrate in South East Lakes 2007-2011

### 4.3 Summary

While the trends for chlorophyll and nitrate levels are improving, none of the lakes in the south-east met the WFD standard of good to be achieved by 2015. The rising trend for total phosphorus is also of concern. The main pressures appear to be diffuse pollution from intensive agriculture and septic tanks resulting in nutrient enrichment as typified by elevated phosphorus.

## 5. Groundwater quality

Groundwater, which originates from rain that soaks into the ground, is an important natural resource in Ireland. It flows through and is stored in the fractures in bedrock and the pore spaces of sand and gravel deposits. In the past the focus was on its use as drinking water; however under the WFD there is an increased emphasis on the environmental quality of groundwater, as well as its value as a potable water supply. Groundwater plays an essential role in the hydrological cycle and is critical for maintaining river levels and surface water ecosystems.

In Ireland approximately 25% of the public and private drinking water supply is groundwater. Most of the private group schemes and small supplies are reliant on groundwater and many have inadequate or no treatment. Therefore it is critical that groundwater is protected to maintain the quality of drinking water and ensure the water is safe to drink.

### 5.1 Physico-Chemical & Biological Monitoring

In 2011 the Environmental Protection Agency's national groundwater monitoring programme included 69 monitoring locations in the South Eastern River Basin District (SERBD). The breakdown of groundwater monitoring points in each county in the SERBD is presented in Table 5.1.

**Table 5.1** *Number of monitoring points in each of the SERBD Counties*

County	Number of Groundwater Monitoring Points	County	Number of Groundwater Monitoring Points
Carlow	3	North Tipperary	6
Kildare	9	South Tipperary	11
Kilkenny	10	Waterford	6
Laois	11	Wexford	8
Offaly	3	Wicklow	2

These sites were monitored for a variety of physico-chemical and microbiological parameters. Nitrate and phosphate, two of the main indicators of anthropogenic pollution, were measured and these are discussed in more detail in Section 5.2.

### 5.2 Assessment of Water Quality

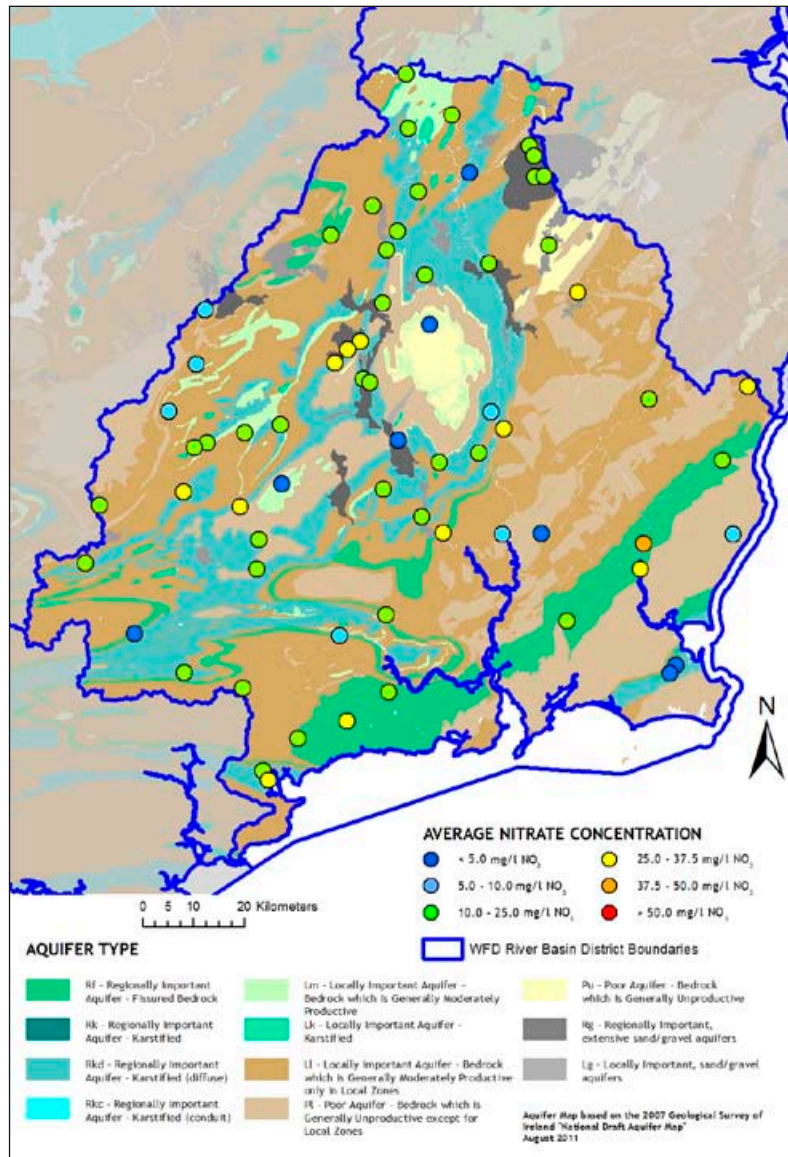
Nationally over 85% of groundwater bodies are of good ecological status. The SERBD (and the South Western RBD) compares very well with the national picture with over 97% of groundwater bodies of good ecological status. However the Shannon RBD (of which a part lies in counties Laois and North Tipperary) fares less well – only 75% is of good status. This is mainly due to nutrient enrichment (especially phosphate) from diffuse sources.



## Nitrates in Groundwater

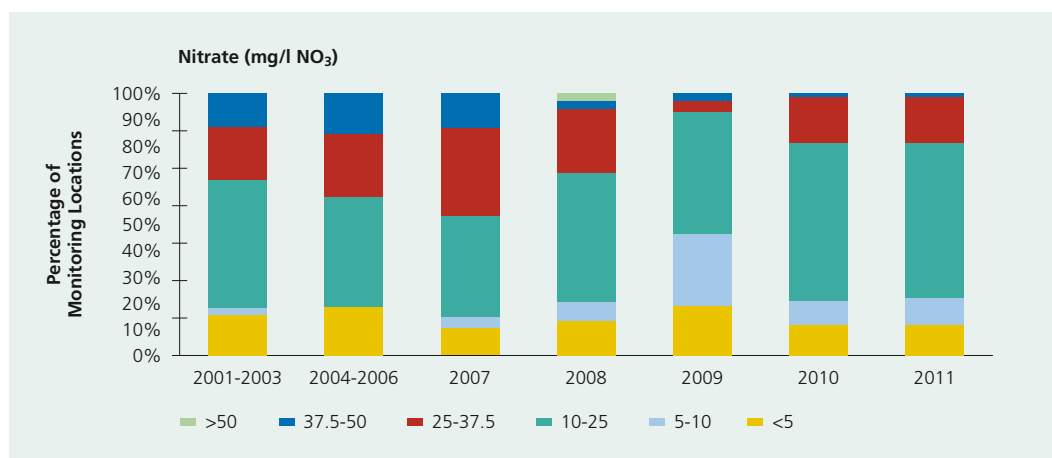
Nationally, the south and south-east of the country continue to have the greatest proportion of monitoring locations with elevated nitrate concentrations; with intensive agricultural practices the probable cause (McGarrigle et al, 2010). Figure 5.1 shows the locations and the associated average nitrate concentrations for the SERBD groundwater monitoring points in 2011.

**Figure 5.1** Average Nitrate Concentrations in the SERBD in 2011



Source: EPA (A. Mannix and M. Craig)

Figure 5.2 shows the average nitrate concentrations from 2001-2011 for the groundwater monitoring programme in the SERBD. The average nitrate concentration in 2011 can be compared with the corresponding yearly averages for 2007 to 2010 and the three year averages from 2001 to 2006. In 2010 and 2011 there are a similar proportion of monitoring locations with an average nitrate concentration >25 mg/l NO<sub>3</sub>.

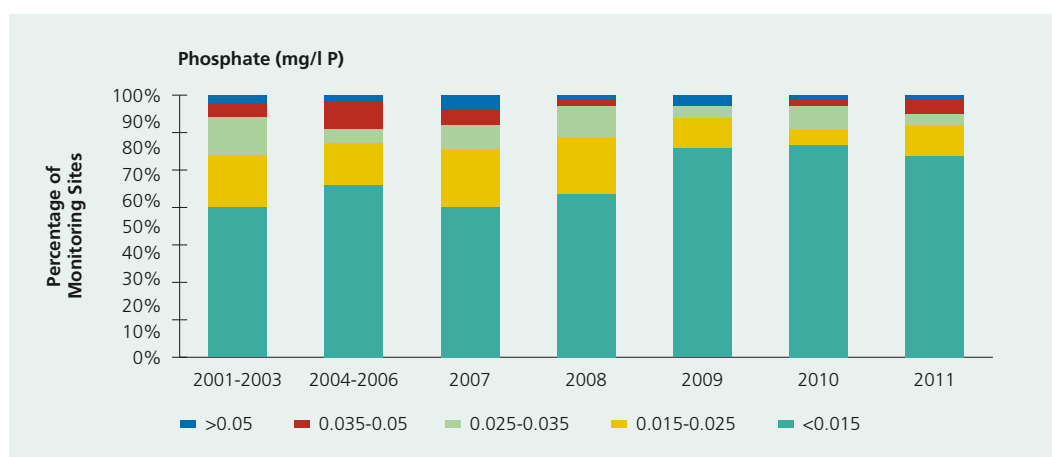
**Figure 5.2** Average Nitrate Concentrations in Groundwater in the SERBD

Source: EPA (A. Mannix and M. Craig)

There was a noticeable decrease in the overall nitrate concentration in 2009, compared with 2010 and 2011, which can be attributed to, amongst other factors, dilution caused by the above average levels of rainfall that year. While 2010 and 2011 showed increased nitrate levels compared with 2009, the overall nitrate concentrations in groundwater in the SERBD have decreased significantly over the period 2001 to 2011. In 2011 the average nitrate concentration exceeded the Irish WFD Threshold Value concentration of 37.5 mg/l NO<sub>3</sub> at one monitoring location in the SERBD. However, the Drinking Water Standard of 50 mg/l NO<sub>3</sub> was not exceeded at this location.

### Phosphates in Groundwater

Figure 5.3 shows the average phosphate concentrations from 2001-2011 for the groundwater monitoring programme in the SERBD.

**Figure 5.3** Average Phosphate Concentrations in Groundwater in the SERBD

Source: EPA (A. Mannix and M. Craig)

The average phosphate concentration in 2011 can be compared with the corresponding yearly averages for 2007 to 2010 and the three year averages for 2001 to 2006. The Irish WFD Threshold Value concentration of 0.035 mg/l P should be considered when assessing the contribution of phosphate in groundwater to rivers. The proportion of monitoring locations with an average phosphate concentration >0.035 mg/l P is greater in 2011 than in the three previous years (2008-2010). However, in the SERBD in 2011, 88% of monitoring locations had average concentrations <0.025 mg/l P and only one monitoring location had an average concentration >0.050 mg/l P.

### Other Parameters

Between 2007 and 2010, monitoring was undertaken to assess the impacts of diffuse pollution from pesticides and organic carbon compounds, including hydrocarbons. The Drinking Water Standard for pesticides (0.01 µg/l) was exceeded in 16 out of 18,722 groundwater samples taken nationally, and there were no organic carbon compound exceedances. In future a less intensive monitoring programme will be put in place for these low risk chemicals (McGarrigle et al, 2010).

Faecal contamination of groundwaters is also an issue and indicates septic tank or agricultural contamination from faecal matter. In 2010 44% of samples taken in the south-east contained coliforms – this is in broad agreement with the national picture where 40% of samples contained coliforms in the same period.

### Sources of Pollutants

It is unlikely that the impact from point sources, such as mines, quarries and landfills, will have a significant effect on an entire groundwater body (McGarrigle et al, 2010). Diffuse sources of pollution include nutrient pressures from agricultural activities (especially nitrates), and agrochemicals.

## 5.3 Summary

In many Irish rivers, more than 30 per cent of the flow is derived from groundwater, rising to 90 per cent in periods of low flow. Therefore the quality of groundwater can have a major impact on the quality of river water. While nitrates in groundwater in the south-east have been decreasing in the last 10 years, they remain high relative to the rest of the country. A similar trend in nitrate concentrations is seen in the rivers of the SERBD. Over the same period there was also an overall decrease in phosphate concentrations. However, the slight increase in phosphate concentration in 2011 highlights the importance of continuing with programmes of measures to ensure that overall nutrient loss to groundwater of nitrates and phosphates is minimised. Contamination by faecal coliforms is a particular cause of concern if the groundwater supply is being used as a drinking water supply. Continued improvements in the understanding of the interactions between groundwater and surface water are very important to maximise the effectiveness of any programmes put in place.

## 6. Transitional & Coastal Waters

### 6.1 Physico-Chemical & Biological Monitoring

The EPA has been monitoring and assessing the estuarine and coastal status of Irish waters since the early 1990s. Following the introduction of the Water Framework Directive (WFD) the monitoring programme has intensified and the EPA now monitors 120 water bodies up to four times per year, once in the winter and three times during the summer period. In addition to more traditional eutrophic-status monitoring, such as nutrient and oxygen concentrations, the assessment now covers a wide range of biological elements such as seaweeds, phytoplankton and seagrass. This holistic ecological assessment is an essential part of the WFD and, in conjunction with the Marine Institute and Inland Fisheries Ireland programmes, a comprehensive overview of the ecological status of Ireland's tidal waters can now be provided.

The transitional and coastal waters of the South Eastern RBD (SERBD) cover an area of just over 1,000 km<sup>2</sup> and comprise tidal freshwater rivers (e.g., the upper Suir and Slaney estuaries), partially mixed estuaries (e.g., the middle Suir estuary), transitional lagoons (e.g., the North and South Slob Channels), tidally mixed and seasonally stratified coastal waters (e.g., Waterford Harbour and the Eastern Celtic Sea, respectively).

Transitional and coastal water bodies are monitored for the following parameters: salinity, temperature, pH, transparency, DO, BOD, TON, ammonia, dissolved inorganic nitrogen (DIN), o-phosphate and chlorophyll a.

A Trophic Status Assessment Scheme (TSAS) has been developed to capture the cause-effect relationship of the eutrophic process and considers the following:

- Enrichment of waters by nutrients (dissolved inorganic nitrogen and phosphorus)
- Accelerated algal growth (chlorophyll)
- Undesirable disturbance (oxygen status)

By assessing the results of analysis of DO, BOD, o-phosphate and DIN, in summer and winter, a trophic status is assigned.

Priority substances are also monitored and details of this programme which is undertaken by the Marine Institute are available at <http://oar.marine.ie/handle/10793/635>.

## 6.2 Assessment of Water Quality

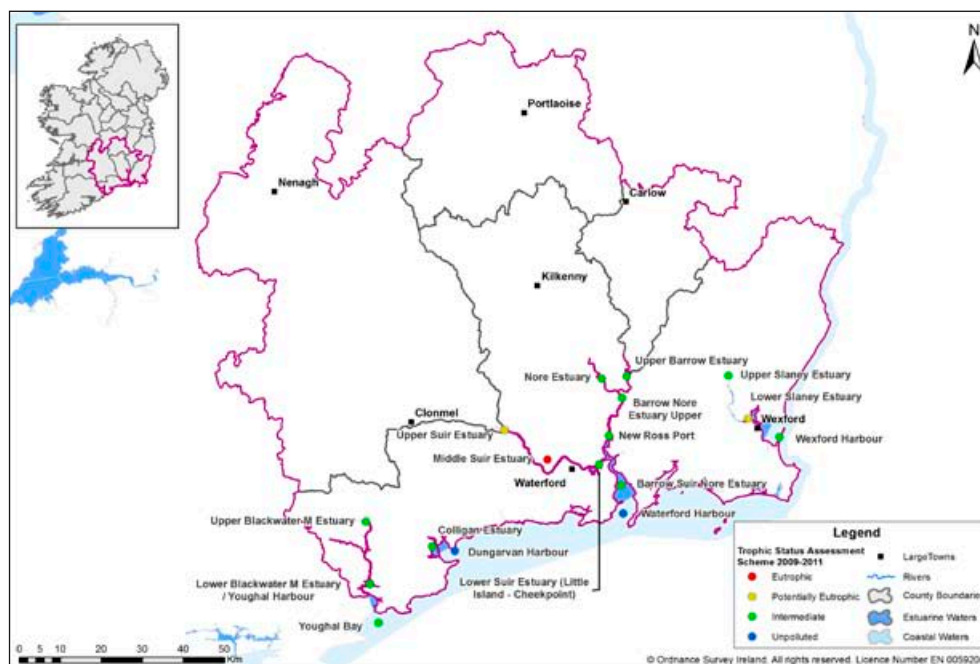
The rivers of the south-east deliver some of the highest nutrient loadings nationally. For example in 2010 the combined loadings of nitrogen from the Suir, Barrow, Nore and Slaney rivers, at 26,168 tonnes of nitrogen, represented just under 45 per cent of the national total. The latest assessment indicates that the middle Suir estuary is eutrophic, while a further 2 areas, the lower Slaney estuary and upper Suir estuary are potentially eutrophic. In terms of ecological status, as defined under the Water Framework Directive, of the 18 water bodies assessed, 10 were found to be 'moderate or worse', seven were 'good', and one was 'high'.

In terms of point sources, five of the 10 largest waste water treatment plants in the SERBD discharge directly to tidal waters. The largest discharge of over 190,000 p.e. from Waterford City discharges into the lower Suir estuary.

Of the 14 estuarine and coastal water bodies in the south-east assessed in the period 2007 to 2009, 4 were classed as eutrophic, and just 2 as unpolluted. This compares unfavourably with the national average as can be seen from the table below:

Trophic Status	South-east (%)	National (%)
Eutrophic	29	10
Potentially Eutrophic	7	5
Intermediate	50	35
Unpolluted	14	50

**Figure 6.1** *Trophic Status of South-East Coast 2011*



### 6.3 Bathing Waters

In 2011, 12 bathing waters in the south-east were monitored during the bathing season, out of a total of 135 locations nationally. The monitoring of bathing waters is the responsibility of the relevant local authority, and sampling must be undertaken at regular intervals during the bathing season which runs from June 1st to September 15th each year.

A new Bathing Water Directive (2006/7/EC) was transposed into Irish law in 2008 (S.I. 79 of 2008) and will replace the existing regulations (S.I. 155 of 1992) on 31st December 2014. This new directive sets tight microbiological standards for two new parameters – intestinal enterococci (IE) and *E. coli*. Previous assessments were based on total and faecal coliforms and some physico-chemical measurements. In the meantime, transitional arrangements are in place and from 2011 the new microbiological parameters are being monitored. At present bathing waters are classified as good, sufficient or poor. From 2015 microbiological assessments will be used to add a further category of excellent. A classification of sufficient will be required for all bathing waters by 2015.

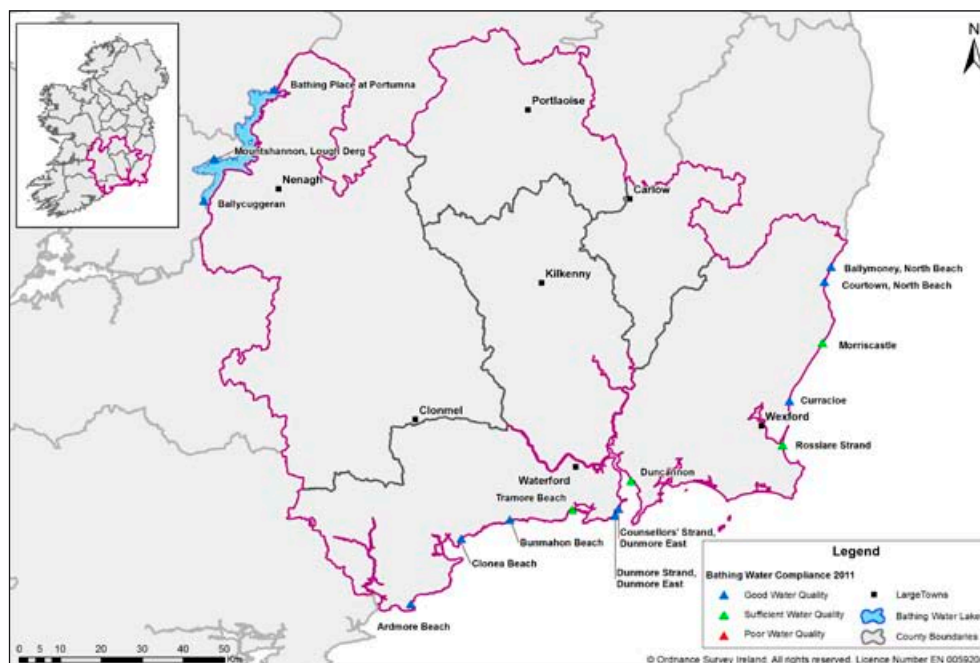
Results for the bathing waters in the south-east for the 2011 bathing season are provided in Table 6.1 and Figure 6.2. These show that all designated bathing areas in the SE achieved “sufficient” status (compared with 98.5% of all sites in the country). In addition, 8 of the 12 sites (66%) achieved “good” status, however nationally that figure was 83%.

**Table 6.1 Bathing Water Quality in South-East Ireland 2011**

Responsible Local Authority	Bathing Area	Water Quality Status 2011	Compliance with mandatory/guide values		
			<i>E. coli</i>		IE
			Mandatory	Guide	Guide
<b>Waterford County Council</b>	Ardmore Beach	Good	✓	✓	✓
	Bunmahon Beach	Good	✓	✓	✓
	Clonea Beach	Good	✓	✓	✓
	Counsellor's Strand, Dunmore East	Good	✓	✓	✓
	Dunmore Strand, Dunmore East	Good	✓	✓	✓
	Tramore Beach	Sufficient	✓	✓	✗
<b>Wexford County Council</b>	Ballymoney, North Beach	Good	✓	✓	✓
	Courtown, North Beach	Good	✓	✓	✓
	Curraclloe	Good	✓	✓	✓
	Duncannon	Sufficient	✓	✓	✗
	Morriscastle	Sufficient	✓	✓	✗
	Rosslare Strand	Sufficient	✓	✓	✗



**Figure 6.2** *Bathing Waters in South East Ireland 2011*



## 6.4 Summary

While phosphorus is the limiting nutrient for plant growth in fresh water, nitrogen is considered limiting in saline waters. The Slaney and Barrow estuaries produce some of the highest winter nitrogen values (reflecting the high tillage activity in the South-East).

Point sources of pollution from Waste Water Treatment Plants and diffuse sources from agriculture (mainly tillage) are significant contributors to the nutrient loadings, and consequent eutrophication of transitional and coastal water bodies in the south-east, which is higher than the national average.

As with lakes, reduction in nutrient loadings from rivers is critical in improving the status of Ireland's transitional and coastal waters.

On a national scale there has been a reduction in eutrophic water bodies since the mid 1990s, and an increase in unpolluted water bodies. In the south east, Wexford Harbour which was previously classed as eutrophic is now classed as unpolluted, however the Colligan has shown a decline in quality due to the presence of green opportunistic algae which had not been formally assessed previously.

In relation to bathing water, all sites in the south-east were classified as good or sufficient in 2011, however at some sites there have been variable results in the past – for example Ardmore, Duncannon, and Dunmore East (Main Strand and Councillors Strand). 66% of sites in the south-east were classified as being of good status, this compares poorly with 83% good sites nationally. While the south-east bathing waters meet the current minimum standards, the stricter criteria in Directive 2006/7/EC will require local authorities to make even greater efforts to improve the water quality and tackle potential sources of pollution.

## 7. Overall Assessment and Conclusions

The Water Framework Directive requires that by 2015 the following be achieved:

- Prevent Deterioration of Water Bodies
- Achieve good status for all water bodies
- Reduce Chemical Pollution
- Achieve water related protected area objectives.

Monitoring of rivers, lakes, groundwaters and transitional and coastal waters in the south-east indicates that while there have been welcome improvements in some areas, work remains to be done in others, particularly in addressing point source pollution from Waste Water Treatment Plants and diffuse pollution from agriculture and septic tanks.

One of the aims of this report is to present an assessment of progress towards meeting the objectives of the WFD as set out in the respective River Basin Management Plans. In 2009, 47% of river bodies in the SERBD achieved at least good status, in 2011 that figure was 62%. The target for 2021 is to have 100% of river bodies in the SERBD achieving at least good status. This will be a significant challenge for all concerned.

### Rivers

In the period 1998 to 2009 in the south-east, high and good status river channel has remained stable at 62%, and sites classed as having bad status have decreased from 1% to 0%. This slight improvement is welcome, however 38% of river sites remain of less than good status. Nationally almost 71% of rivers are of high or good status. It is also worth comparing the quality of river sites in the south east in 1980, when almost 12% were seriously polluted, to today when less than 5% are seriously polluted (measured according to different criteria – see Appendix 4).

Phosphate levels in rivers appear to have stabilised in recent years, but still at a level that is greater than “good status” as classified by the WFD. Nitrates have also reduced from highs in the mid-1990s, but still remain higher than other parts of the country. The highest nitrate levels in the southeast (and nationally) are in the Clareen stream in Nenagh which discharges to the Nenagh river where nitrates are also relatively high. A list of river sites of concern is provided for each county in the relevant appendix.

Tackling pollution at these sites should lead to an improvement in the quality of groundwater, lakes and transitional and coastal waters as well.

## Lakes

Lakes in the south-east are of moderate or poor status, and it will be a challenge for them to meet the required standard of good status by 2015, particularly Ballyshunnock and Knockaderry reservoir which are currently classed as poor. In the period 2004 to 2006, 40% of lakes in the SERBD were classed as good. (The water quality criteria for lakes in the Surface Water Regulations 2009 are established for deep lakes (>4m mean depth) and are applied only on an interim basis for other lake types – such as the shallow lakes of County Waterford. EQR boundary conditions are yet to be developed for shallow calcareous lakes.) While nitrate and chlorophyll in the main are decreasing, total phosphorus levels are increasing since 2009, having shown a decrease in 2007 and 2008. Diffuse pollution from agriculture and septic tanks seems to be at the heart of the problem.

## Groundwaters

Groundwaters in the south east have higher levels of nitrate than in the rest of the country, however concentrations appear to be decreasing. Phosphate levels also seem to be decreasing, in 2011 88% of samples taken in the south-east contained <0.035mg/l P. Faecal contamination of groundwaters is an issue, with 44% of samples taken in 2010 containing coliforms, indicating septic tank or agricultural contamination from faecal matter.

The close relationship between groundwater and surface waters needs to be fully appreciated in order to holistically address nutrient levels in all water bodies.

## Transitional and Coastal Waters

Transitional and coastal waters are feeling the effects of high nutrient loadings from rivers in the south-east – much of this is diffuse arising mainly from agricultural activities. However, a substantial portion comes from point sources, with 5 of the 10 largest WWTPs in the SERBD discharging to tidal waters. In terms of ecological status, as defined under the Water Framework Directive, of the 18 water bodies assessed, over half were found to be 'moderate or worse'.

Bathing water quality in the south-east in 2011 was of good or sufficient quality. However from 2015, more stringent criteria will be in place, which will require even greater efforts by local authorities to improve water quality and tackle sources of pollution.

## Urban Waste Water Discharges

Municipal waste water discharge is one of the main sources of pollution in Irish rivers, and the control of these discharges is critical in the protection of water bodies. The main effects of pollution from municipal sources is nutrient enrichment, and to a lesser extent excessive siltation. These two effects lead to decreased biodiversity in our rivers, and excessive weed and algal growth.

While there have been some improvements in the quality of rivers affected by municipal waste water pollution, notably the Nore at Thomastown where the Q value has increased from 2 (poor quality) in 2007 to Q4 (good quality) in 2010, there are still problem areas. The Duncormick in Wexford is moderately polluted downstream of Taghmon, most likely due to the ineffective water treatment plant. It is hoped that the upgrade of this treatment plant will lead to improved quality in the river.

Similarly the Owenass in Co. Laois suffers the effects of sewage discharges from Mountmellick Waste Water Treatment Plant, also undergoing an upgrade. The Tullamore River in Co. Offaly is a tributary of the Clodiagh, part of which flows through Co. Laois, and both rivers are affected by sewage from Tullamore, again undergoing an upgrade at present. These investments in waste water treatment plants should have a marked beneficial effect on the quality of the rivers they discharge to as they come on-stream.

### Diffuse Discharges

Diffuse discharges – mainly from agriculture and septic tanks are more difficult to address than point sources.

Legislation through the Nitrates Directive (S.I. 101 of 2009) is the main measure for addressing agricultural pollution. These regulations also provide statutory support for good agricultural practice to protect waters against pollution. There have been improvements in agricultural pollution in recent years, but a significant portion of farms nationally may be non-compliant with the Nitrates Regulations. Effective inspection and enforcement regime is needed to ensure full compliance. The risk-based approach adopted by Local Authorities in conjunction with the Department of Agriculture, Fisheries and Food, for farm inspections is welcomed as an efficient way of tackling this problem.

One of the main challenges as regards diffuse agricultural pollution will be the removal of milk quotas at the end of 2015, when it is expected the dairy herd population will increase significantly, and especially in the south and south-east where traditionally much of the national dairy herd resides. Work is being done by the Kilkenny Food Strategy Environmental Group to try to identify problems and possible solutions to this issue.

Nutrient from septic tanks are a significant issue. Studies in Kilkenny have shown that since 1971 nitrogen loadings have increased by approximately 50% to 170 tonnes per annum, and phosphorus loadings have also increased (Ray Spain – *Food Harvest 2020*). In 2009 the EPA published a new binding Code of Practice to provide guidance on the provision of waste water treatment and disposal systems for new single houses. For existing unsewered properties, improvements are required regarding the operational performance, maintenance and monitoring arrangements of septic tanks and other on-site treatment systems serving such properties. It is hoped that these requirements will ensure environmentally sustainable rural development, protecting vulnerable groundwaters, including drinking water supplies.

### Forestry

Forest occupies less than 5% of the total land area of the SERBD. Pressures exerted by forestry include artificial acidification of waters arising from the presence of coniferous afforestation on acid-sensitive soils; and nutrient enrichment and siltation and sedimentation impacts from forestry operations. Many of these afforested areas are located in sensitive salmon and trout spawning catchments, such as the River Slaney's headwaters, underpinning the need for adequate control on forestry operations in sensitive areas.

## Conclusion

In general the south-east faces more challenges in achieving the targets of the Water Framework Directive than other parts of the country. Rivers, lakes and transitional and coastal waters compare poorly with national figures as regards number of water bodies achieving good status.

The biggest threat to water quality in the south-east is from excessive nutrients – phosphate in freshwaters and nitrate in transitional and coastal waters. The main sources of these nutrients are waste water treatment plants, run-off from agricultural land and contamination from septic tanks. Improvements in collection systems and reduction of nutrient discharges will bring about an improvement in the status of all water bodies in the south-east.

The projected increased output under *Food Harvest 2020*, as well as the removal of the dairy quota in 2016, will provide significant challenges in managing the quality of all water bodies, and achieving the aims of the Water Framework Directive in the south-east.

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# An Gníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaoil do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaoil na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

## ÁR bhFREAGRACHTAÍ

### CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaoil i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- díantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreal;
- scardadh dramhuisce.

### FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil – aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí comhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaoil mar thoradh ar a ngníomhaíochtaí.

### MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOIL

- Monatóireacht ar chaighdeán aer agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

### RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA hÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

### TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheistanna comhshaoil a chomhordú (cosúil le caighdeán aer agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

### MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaoil na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

### PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheistanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaoil a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

### BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

### STRUCHTÚR NA GNÍOMHAIREACHTA

Bunaíodh an Gníomhaireacht i 1993 chun comhshaoil na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstiúrthóir agus ceithre Stiúrthóir.

Tá obair na Gníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheistanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.





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