Report on River Water Quality in Waterford

2013

Contents

1. Overview

This report provides an assessment of river water quality in County Waterford in 2013. It should be read in conjunction with the other data and assessments provided under the South East River Basin district report.

The report is presented in the following sections:
(i) The first part of the report provides a general assessment of the state of rivers in the county, with graphs showing trends in annual average o-phosphate and nitrate concentrations in the County since 2001.
(ii) The third section identifies the river sites which require further investigation and the suspected causes of pollution. They were selected on the basis of having a Q value less than 4 (i.e. moderate or worse status), poor chemistry, or there were other significant pollution issues.
(iii) The fourth section provides a summary assessment of water quality for each river, having regard to the relevant Q values and WFD criteria for the 4 key physico-chemical parameters BOD, ammonia, o-phosphate and Nitrate.
(iv) Sections five and six include long term graphs for both o-phosphate and nitrate in Waterford Rivers. These are based on three year rolling means.
(v) Finally there are a set of maps which provide an indication of river water quality based on the 4 key physico-chemical parameters. These maps compare the annual average for each parameter at each river station against the relevant EQS.

1. General Assessment & Trends

Compared to the national picture, water quality in County Waterford remains quite good. In terms of ecological status, just 83% of river stations in the county are at least good status compared with 65% nationally.

The general physico-chemical data suggests that there was a slight deterioration in water quality in 2013 compared to 2012. As indicated in the table below, there was a slight decrease in the percentage of river stations which exceeded the Good status EQS for o-phosphate and BOD levels however the percentage of rivers which exceeded the EQS for ammonia increased by more than double for 2013 compared to 2012. There was also a slight increase in the nitrate levels in 2013.

Parameter	2013 (%)	2012 (%)
Ammonia	32.9	15.6
o-Phosphate	25.0	29.9
Nitrate	76.3	75.3
BOD	30.3	31.2

Table 1. % of River Stations that exceeded the EQS for Good status for each parameter in 2013 compared to 2012.

The drop in the percentage of rivers which exceeded the Good status for ortho-phosphate was coupled with the fact that the annual ortho-phosphate concentration in Waterford rivers in 2013 remained stable. The ortho-phosphate levels have fluctuated over the time period 2001 - 2013 but the trend is generally downward since 2007 with the annual average ortho-phosphate concentration in 2012 and 2013 reaching its lowest level since 2002. The ortho-phosphate average level reached Good status in 2012 and remained so for 2013. The challenge is now to reduce levels further to achieve High status.

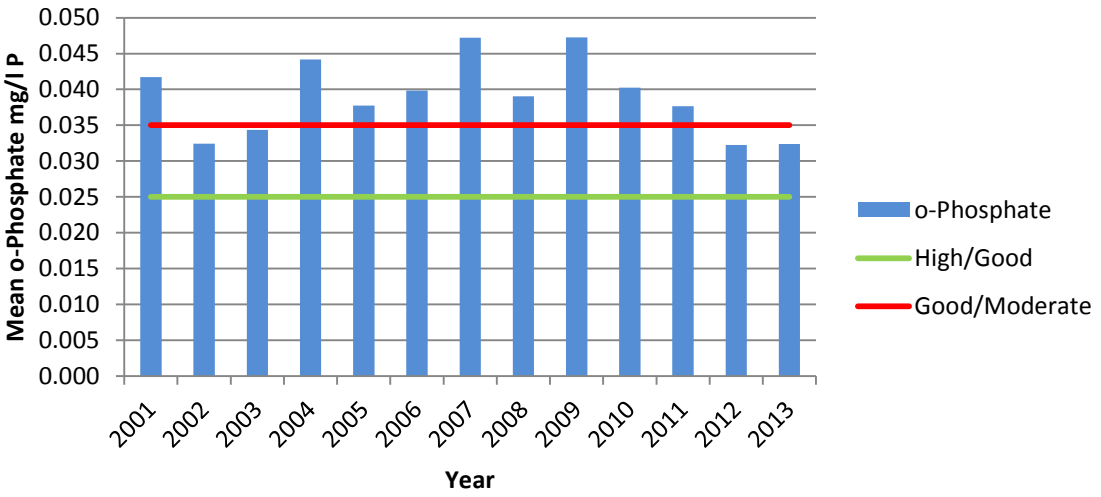


Fig 1. Annual average ortho-phosphate levels in Waterford rivers 2001 – 2013.

There was a slight increase in the number of sites which exceeded the Good status for the surrogate EQS for nitrate. Nitrates are a significant problem in Waterford rivers. Average nitrate levels fell between 2006 and 2012. In 2013 however, there was a slight increase in the average concentrations. The average nitrate concentration has consistently exceeded the surrogate EQS for Good Status over the past 14 years.

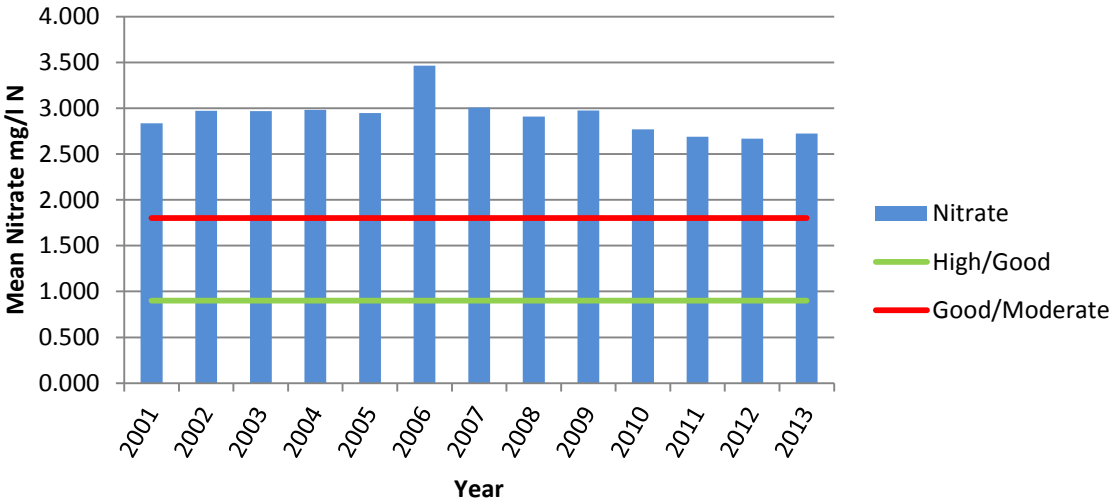


Fig 2. Annual average nitrate levels in Waterford rivers 2001 – 2013.

With the advent of the Water Framework Directive compliance rules for certain river chemistry determinands were applied to the data collected. Assessment is based on the four most significant contributing parameters to water quality, namely BOD, ammonium, ortho-phosphate and TON. Sites are identified as passing or failing based on an assessment of the mean and 95%ile of these parameters. Sites fail chemistry where two or more parameters fail the set criteria. While few sites fail two parameters, a significant number of sites fail a single parameter (in the majority of cases this is due to TON). Where a site fails one parameter, it is described as being of concern. The data for the Waterford rivers since the start of the WFD monitoring (2007) is shown in Table 2. The percentage of sites which fall into each category is trended over 3 year rolling cycles (Figure 3.).

Chemical monitoring since 2007 indicated an improving trend in all Waterford rivers. This trend stabilised in 2013. No sites have failed chemistry in any cycle since 2007 and the number of passing sites has increased from twenty-three in 2007 - 2009 to forty-five for 2011 - 2013.

While chemical monitoring indicates an improving trend, it is important to also remain focussed on maintaining the status of those sites that are already at Good or higher status.

Year	No. of Stations	Pass	Of Concern	Fail
2007-2009	67	41	26	0
2008-2010	70	50	20	0
2009-2011	76	54	22	0
2010-2012	76	64	12	0
2011-2013	76	59	17	0

Table 2. Number of river stations by WFD compliance status

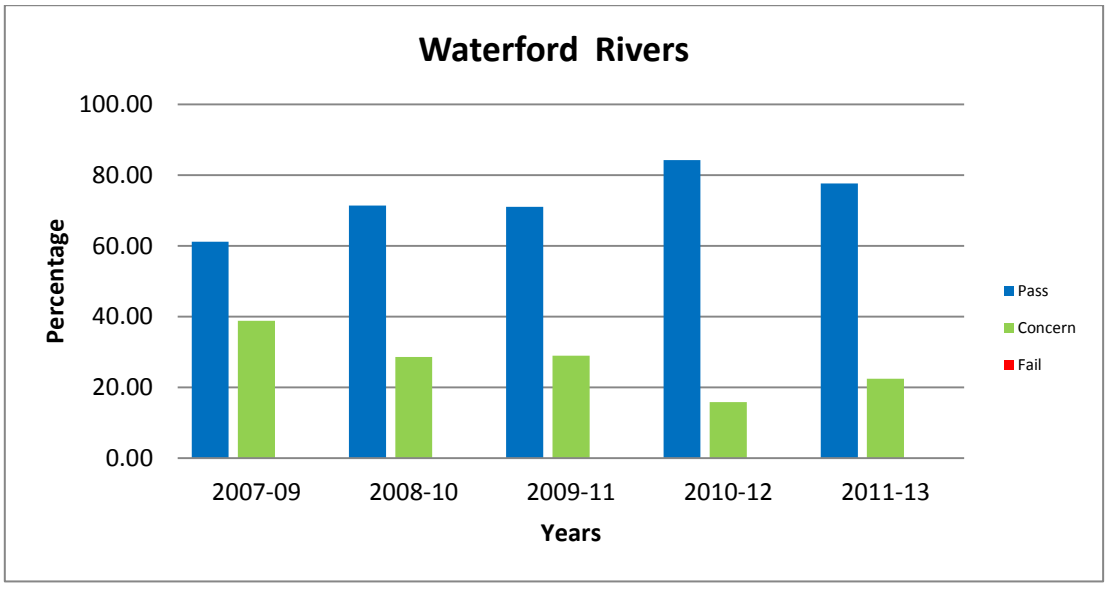


Fig 3. % of river stations by WFD compliance status

Table 3. River stations with the highest average ammonia concentration in 2013 (in decreasing order).

River Name	River Code / Station Number
Clodiagh	16C03-0600
St.John's	16S03-0400
St.John's	16S03-0100
St.John's	16S03-0050
Finisk	18F02-0100

Table 4. River stations with the highest average o-phosphate concentration in 2013 (in decreasing order).

River Name	River Code / Station Number
St.John's	16S03-0050
Kilmurrin Cove Stream	17K03-0200
St.John's	16S03-0100
St.John's	16S03-0300
St.John's	16S03-0320

Table 5. River stations with the highest average nitrate concentration in 2013 (in decreasing order).

River Name	River Code / Station Number
St.John's	16S03-0310
Brickey	17B01-0050
Brickey	17B01-0090
Dunhill	17D02-0200
Bride	18B05-0800

Table 6. River stations with the highest average BOD concentration in 2013 (in decreasing order).

River Name	River Code / Station Number
St.John's	16S03-0300
St.John's	16S03-0050
St.John's	16S03-0100
St.John's	16S03-0200
Whelan's Bridge	16W01-0400

3. WFD River Sites for further investigation

There are over 900 river sites of less than good status across the country – that is they have a biological Q value of 3 - 4 or less. There are six river stations in County Waterford (that are also monitored for chemical determinands) that have a Q value of 3 - 4 or less. These have been identified as sites for further investigation. Table 8 lists all these sites along with the suspected causes and any relevant additional comments.

Waterford is a predominantly rural county with three significant urban conurbations in Waterford City, Tramore and Dungarvan. Agriculture is one of the main activities in the county. Diffuse pollution from agriculture as well as small point sources such as small urban wastewater treatment plants (UWWT), domestic wastewater treatment systems (DWWTS) and farmyards are significant contributory pressures. The predominant pollution sources in the more urbanised areas are discharges from wastewater treatment plants, storm water overflows and industrial discharges. It must be borne in mind that multiple pressures may impact on any given site. Further work is required also in order to better distinguish between the impacts of DWWTS and diffuse agricultural sources. The pathways by which pollutants reach water are similar for those emanating from DWWTS and from agricultural sources, whether farmyard or field. If sources of pollution affecting rivers can be reduced or eliminated, this will have a positive knock-on effect on lakes, estuaries and ground-waters in the region.

The EPA is responsible for the licensing or certification of all discharges to the aquatic environment from sewerage systems owned, managed and operated by Irish Water. The licensing and certification authorisation process was introduced on a phased basis commencing on 14th December 2007 in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007 (SI No. 684 of 2007). Up to the end of 2013 eleven licences were issued in County Waterford and are shown in Table 7 below. Two licences were issued in 2013 for Stradbally and Baile na nGall.

Table 7. Wastewater discharge licences issued in Waterford up to end of 2013.

Agglomeration	Licence No.	Authority	Date Issued
Tramore	D0015-01	Irish Water	21/12/09
Dungarvan	D0017-01	Irish Water	15/12/09
Wateford City	D0022-01	Irish Water	6/1/2010
Ardmore	D0162-01	Irish Water	26/4/10
Dunmore East	D0170-01	Irish Water	8/12/11
Lismore	D0176-01	Irish Water	24/12/12
Cappoquin	D0272-01	Irish Water	1/11/12
Tallow	D0273-01	Irish Water	26/1/12
Kilmacthomas	D0275-01	Irish Water	13/7/11
Stradbally	D0353-01	Irish Water	16/10/13
Baile na nGall	D0358-01	Irish Water	16/10/13

Both diffuse and point source pollution are key pressures in Co. Waterford. Many of the point sources are due directly to wastewater discharges. A number of the plants do not have secondary treatment and upgrade works are scheduled or in progress. It is hoped that the licencing of these plants will show improvements over the coming years.

The focus on domestic waste water treatment systems (DWWTS) has continued to increase in recent years. In 2013, a National Inspection Plan for DWWTS was published in response to the European Court of Justice finding that Ireland had not met the legal obligation required by the 1975 Waste Framework Directive to regulate the waste water generated in our unsewered areas. Nationwide inspections commenced in 2013, starting with areas at greatest risk of damage to human health or the environment. Inspections were not carried out in Co. Waterford in 2013.

It is apparent that diffuse agricultural pollution is a key pressure in Co. Waterford. Animal access to rivers as well as spreading of wastes are issues that need to be addressed. Food Harvest 2020 has the potential to put further pressure on water quality with the proposed increase in output likely to be challenging in Co. Waterford. Twenty-five farm inspections were carried out by Waterford County Council during 2013. Thirteen enforcement letters or verbal warnings were issued. A further sixty-six farms were inspected by DAFF inspectors under GAP regulations and thirty of these were subject to penalties.

The main pollution pressures in the urban conurbations are due to UWWTP and industrial discharges. These discharges are licenced by either the EPA or the local authority. During 2013 all thirty-seven of the Waterford Section 4 licences were reviewed for surface water assimilative capacity. One was considered to be unsatisfactory and the licence was under active review in 2013. Remedial works were sought and it is expected to be resolved in 2014. Twenty additional eligible discharges to waters were also identified and these are due to be licenced during 2014. An unsatisfactory Section 16 licenced discharge was investigated and improvement works were to be carried out. If sources of pollution affecting rivers can be reduced or eliminated, this will have a positive knock-on effect on lakes, estuaries and ground-waters in the region.

Table 8. Sites for further investigation in County Waterford

River	Code	Location	Q Value	Year	Key Pressures	Comments
SUIR	16S02-2700	Kilsheelan Br	3 - 4	2011	Urban	Kilsheelan village
ST JOHN'S	16S03-0300	Bleach Bridge	2	2013	Urban Landfill	Waterford City Kilbarry landfill site
BRICKEY	17B01-0050	Knockmahon Br	3	2013	Agriculture	Diffuse agricultural pressures Drop from Q3-4 in 2010
COLLIGAN	17C01-0250	Killadangan Br	3 - 4	2013	Agriculture and mixed rural influences	Drop from Q4 in 2010
DUNHILL	17D02-0100	Ballyphilip Br	3	2013	Urban (Sewage) Agriculture	ICWs treating effluent from Dunhill Village and nearby farms Drop from Q3-4 in 2010
MAHON	17M01-0200	Br just S of Kilmacthomas	3	2013	Urban	Kilmacthomas WWTP – sewage fungus noted during biological survey in 2013.

2013 Summary of River Water Quality in Waterford

These assessments are based on physico-chemical measurements made during 2013, and the most recent Q values and assessments of the river biologists.

River	Remarks	Change from 2012
Clodiagh (Waterford) **16C03-0050** **16C03-0100** **16C03-0300 Q4 (2011)** **16C03-0400 Q4 (2011)** **16C03-0600** **16C03-0700**	The Clodiagh rises in the Comeragh Mountains and flows through Clonea and Portlaw. Station 0600 flows through the old tannery in Portlaw. Ammonia levels at station 0600 were again high at times in 2013. This is caused by leachate from landfill at the old tannery in Portlaw which closed in 1985. Ammonia, BOD, ortho-phosphate and colour were high at all stations (with the exception of stn 0050) in October during heavy rain.	No significant change during 2012.
Carrickphilip **16C05-0100**	This small stream feeds Knockaderry reservoir. DO levels were low (possibly due to groundwater inflow) throughout the year. Ammonia, BOD, ortho-phosphate and colour were high in October during heavy rain.	Physio-chemical quality was poor in October 2013.
Dawn **16D04-0100** **16D04-0300** **16D04-0500**	The first station on this river is an abstraction point for East Waterford Regional water supply. BOD, was slightly elevated at station 0100 in April and August during heavy rain. Ammonia, BOD and ortho-phosphate were high at stations 0300 and 0500 in October during heavy rain.	No significant change from 2012.
Glenary **16G02-0050** **16G02-0200**	This river rises in the Comeragh Mountains and the first station is a raw water abstraction point for Clonmel. Physico-chemical quality is satisfactory at both stations.	No change from 2012.
Nier **16N01-0010 Q4-5 (2011)** **16N01-0100 Q4-5 (2011)** **16N01-0400 Q4 (2011)**	This river rises in the Comeragh Mountains and flows through Ballymacarbry village. Physico-chemical quality is satisfactory at all stations and ecological quality is high to good status .	No change from 2012.

River	Remarks	Change from 2012
Suir **16S02-2300 Q4 (2011)** **16S02-2400 Q4 (2011)** **16S02-2600** **16S02-2700 Q3-4 (2011)** **16S02-2740 Q4 (2011)** **16S02-2800** **16S02-2900**	This river is 184 km long and has a catchment area of 3613 km^2. The Suir rises in North Tipperary and flows through Tipperary, along the Tipperary/ Waterford and the Waterford/Waterford borders before discharging in to Waterford Harbour. Physico-chemical quality was satisfactory at all stations during 2013, however high Dos were again observed at Kilsheelin Bridge (station 2700) and at Coolnamuck Weir (station 2800) in 2013 similar to measurements noted in 2011. Overall biological monitoring indicates good ecological conditions on this stretch of the river with the exception of station 2700 (Kilsheelin Bridge) which is moderate status.	No significant change from 2012. High DO's noted at times at stations 2700 and 2800.
St. John's River (& tributaries) **16S03-0050** **16S03-0100** **16S03-0200** **16S03-0300 Q2 (2013)** **16S03-0330** **16S03-0350** **16S03-0400** **15S03-0500** **16S03-0600** **16S03-0310(trib)** **16S03-0315(trib)** **16S03-0320(trib)**	This river flows through Waterford City and a significant portion of it is tidal. Sewage, industrial effluents and leachates that previously were discharge to the river are now collected and treated at the new WWTP at Belview Port which was commissioned in 2008-2009. This small river is seriously polluted along most of its length. DOs are frequently low; BOD, ammonia, ortho-phosphate, nitrite and nitrate are frequently elevated, particularly in January and March 2013. Physico-chemical quality is satisfactory in the tributaries (stations 0310,0315 and 0320). Ecological quality is being assessed annually at Bleach Bridge (station 0300). The ecological quality shows bad status again in 2013.	No change from 2012. The quality of this river remains poor.
Whelans Bridge **16W01-0100** **16W01-0400**	This stream flows from Knockaderry Reservoir, through Kilmeaden Village to the River Suir. BOD was intermittently high at both stations during the year.	No significant change from 2012.
Araglin (Colligan) **17A01-0300 Q4 (2013)** **17A01-0400**	Physico-chemical quality was satisfactory at both stations during 2013. Ecological quality fell from high to good status since 2010.	Deterioration in ecological quality to Good status from 2010.

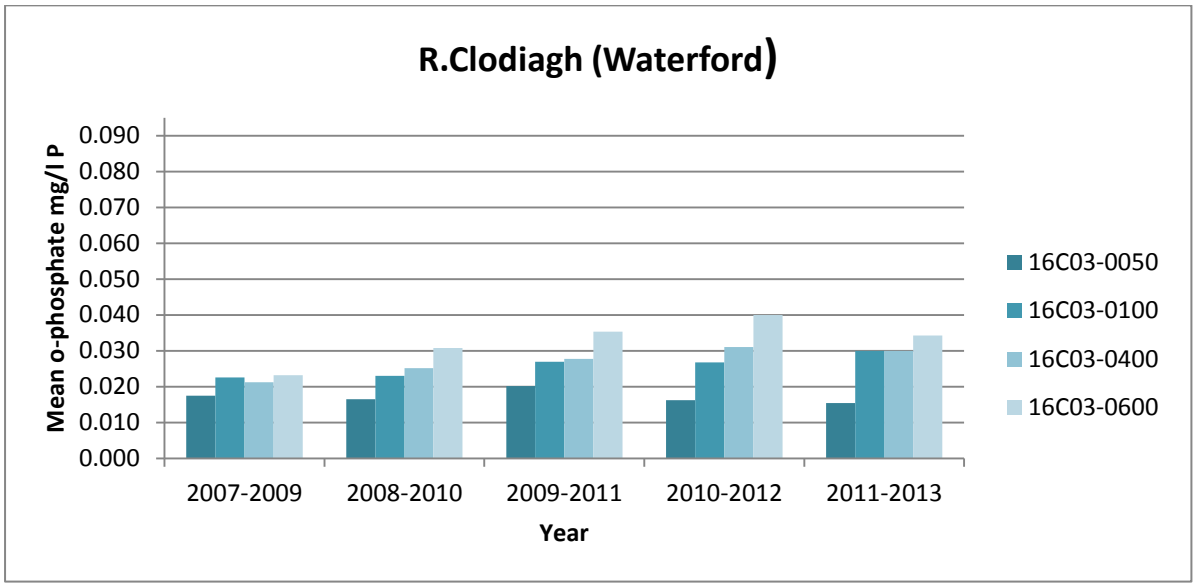
River	Remarks	Change from 2012
Brickey **17B01-0050 Q3 (2013)** **17B01-0090** **17B01-0200**	This river discharges into Dungarvan Harbour. The upper reaches have been drained and now comprise mainly drainage ditches and sluices. Nitrates are elevated at all stations throughout the year. Ammonia and o-phosphate were elevated at stations 0050 (Knockmahon Br) and 0200 (Killongford Br) in October. Biological monitoring indicated a drop in ecological quality from moderate to poor status since 2013.	Deterioration in ecological quality to poor status from 2010.
Ballyscanlon Lake **17B02-0100**	This is an abstraction point for Tramore water supply. BOD was slightly elevated in August again in 2013, this may be due to plankton present in the lake. Ammonia was elevated in October.	No significant change from 2012.
Belle Lake **17B04-0100**	This is the abstraction point for Dunmore East water supply. Pysico-chemical quality is satisfactory.	No change from 2012.
Colligan **17C01-0150 Q4-5 (2013)** **17C01-0250 Q3-4 (2013)** **17C01-0300**	This river flows into Dungarvan Harbour and the lower reaches are tidal. BOD was slightly elevated at time sat station 0150 (Br ESE of Lackandarra) otherwise physico-chemical monitoring was satisfactory during 2013. Biological monitoring indicates that ecological quality remains high at station 0150 but that quality has dropped from good to moderate status at station 0250 (Killadangan Br) from 2010.	Deterioration in ecological quality to moderate status at station 0250 from 2010.
Carrigavantry Lake **17C02-0100**	This lake is an abstraction point for Tramore water supply. BOD was slightly elevated in August again in 2013, this may be due to plankton present in the lake. Ammonia was elevated in October 2013. Otherwise quality is satisfactory.	No change from 2012.
Dalligan **17D01-0300 Q4-5 (2013)**	Physico-chemical monitoring was satisfactory during 2012, and ecological quality remains high following biological assessment in 2013.	No change from 2012.

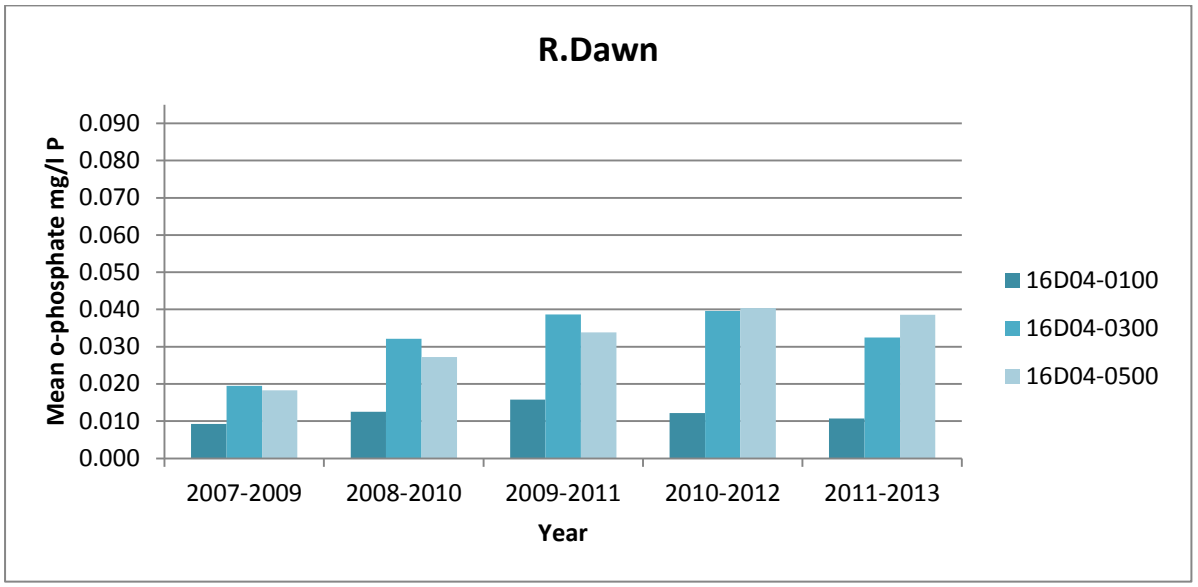
River	Remarks	Change from 2012
Dunhill (Annestown) Stream **17D02-0050** **17D02-0100 Q3 (2013)** **17D02-0200** **17D02-0300**	There are a number of constructed wetlands (reed beds) located along this catchment. One ICW is used to treat sewage from Dunhill Village. Nitrates are frequently elevated. High ammonia and ortho-phosphate were recorded at stations 0100 (Ballyphilip Br), 0200 (Dunhill Lodge) and 0300 (Br. at Annestown) in January 2013. Biological monitoring indicates that ecological quality has dropped from Moderate to Poor status at station 0100 (Ballyphilip Br) from 2010.	Deterioration in ecological quality from moderate status in 2010 to poor at station 0050 in 2013.
Kilmurrin Cove **17K03-0200**	This stream receives effluent from Kill Village. Elevated BOD, o-phosphate, ammonia, nitrite and nitrite were observed at times in 2013.	No change from 2012.
Mahon **17M01-0100 Q4-5 (2013)** **17M01-0200 Q3 (2013)** **17M01-0300** **17M01-0350 Q4 (2013)**	This river flows through Kilmacthomas. Physico-chemical monitoring was satisfactory during 2012. Elevated ammonia at times at station 0200, d/s of Kilmacthomas. Elevated ammonia and BOD values were noted at station 0350 (Br at Annesstown) throughout 2013. Biological monitoring indicates that ecological quality has dropped from moderate to poor quality at station 0200.	Ecological quality has fallen to poor status at station 0300 from 2010.
Tay **17T01-0050 Q4 (2013)** **17T01-0300** **17T01-0400 Q4 (2013)**	This river rises in the Monavullagh Mountains and flows into the sea at Stradbally. Physico-chemical monitoring was satisfactory during 2013. Ecological quality was good in 2013 however the latest monitoring indicates that ecological quality has dropped from from High to Good quality at station 0050 (Aughnacurra Br) from 2010.	Deterioration in ecological quality from high status in 2010 to good at station 0050 in 2013.

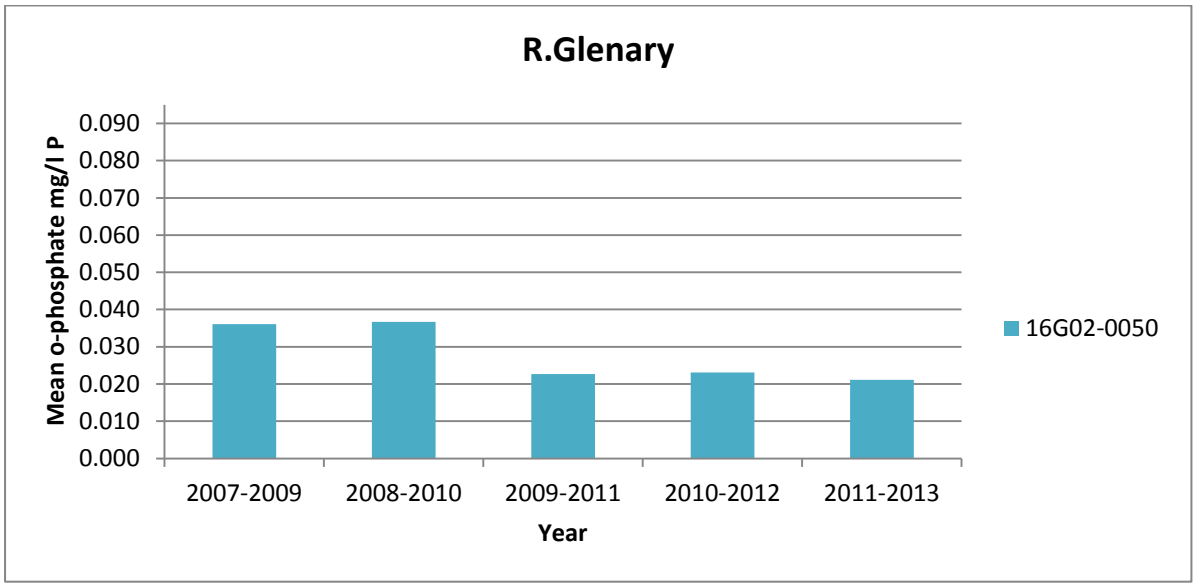
River	Remarks	Change from 2012
Blackwater **18B02-2500 Q4 (2012)** **18B02-2600 Q4 (2012)** **18B02-2700 Q4 (2012)** **18B02-2900** **18B02-3000**	The Blackwater is a designated salmonid river under the Freshwater Fish Directive (78/659/EEC). It rises in Co. Cork and flows into Co. Waterford. The latter stretch is dealt with in this report. Parts of the river are a protected habitat under the Freshwater Pearl Mussel Regulations (SI 296 0f 2009). Colour is intermittently high along the river, otherwise physico-chemical monitoring was satisfactory. Biological monitoring in 2012 indicated good to high ecological conditions with pearl mussels and most recently, crayfish being found. Part of the upper Blackwater Estuary at Cappoquin has suffered in the past from the effects of effluent from Cappoquin Poulty however the facility was closed in 2013.	No change from 2012.
Bride **18B05-0800 Q4 (2012)** **18B05-1000**	The Bride is a Designated Salmonid River under the Freshwater Fish Directive (78/659/EEC). It rises in Co. Cork and flows into Co. Waterford. Only the latter stretch is covered in this report. Nitrates can be elevated at both stations. Ammonia and o-phosphate were elevated in March 2013 while Colour, ammonia, BOD and o-phosphate were elevated in April at Tallowbridge. Ammonia and o-phosphate were also elevated at station 1000 in April.	No significant change from 2012.
Finisk **18F02-0100** **18F02-0300 Q4 (2012)** **18F02-0500 Q4-5 (2012)**	This river joins the Blackwater d/s Cappoquin. High ammonia was noted at station 0100 (Ballynamult Br) and station 0300(Mondelligo Br) in January, otherwise physico-chemical monitoring is s. Biological monitoring indicates good to high ecological quality.	High ammonia observed at stations 0100 and 0300 in January 2013.
Glendine **18G07-0300 Q4 at station 0290 (2012)**	This river drains an area north of Youghal and is a tributary of the Blackwater. Elevated ammonia, BOD and o-phosphate in March possibly due to heavy rainfall otherwise physico-chemical quality is satisfactory with good ecological quality.	No significant change from 2012.
Glennafallia **18G10-0200 Q4 (2012)**	This river rises in the Knockmealdown Mountains and is a tributary of the Blackwater. Satisfactory with good ecological quality.	No change from 2012.

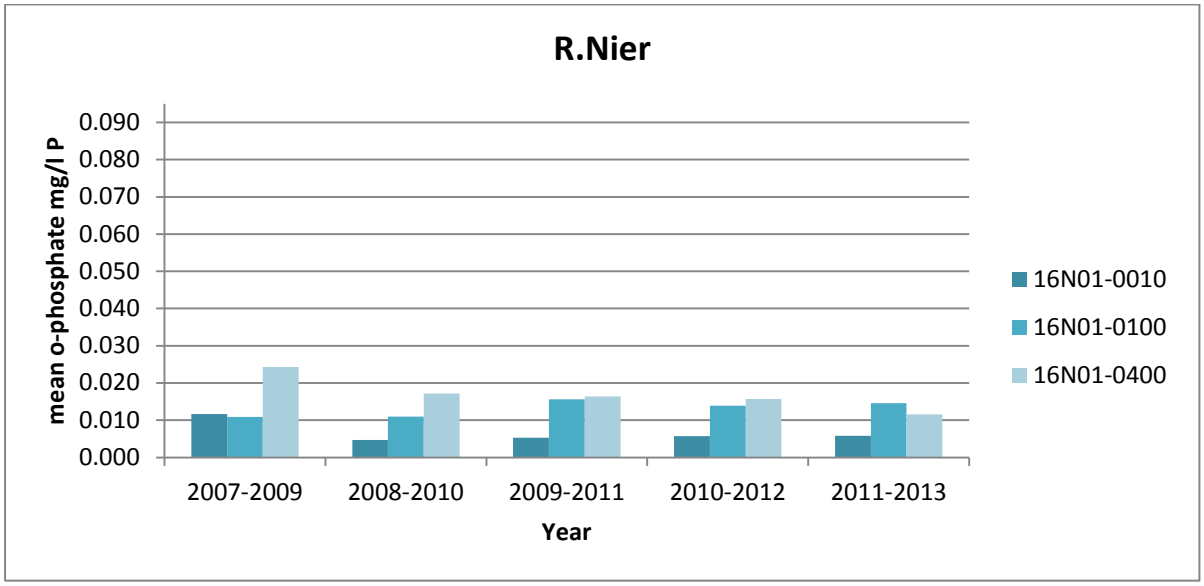
River	Remarks	Change from 2012
Goish **18G12-0200** **18G12-0300 Q4 (2012)**	This river drains an area east of Villierstown and is a tributary of the Balckwater. Satisfactory with good ecological quality.	No change from 2012.
Lickey **18L01-0100 Q4 (2012)**	Station 0100 is a surveillance site under the Water Framework Directive. This sub-catchment is a protected habitat under the Freshwater Pearl Mussel Regulations (SI 296 of 2009). Satisfactory with good ecological quality.	No change from 2012.
Owennashad **18O08-0060 Q4-5 (2012)** **18O01-0200 Q4-5 (2012)**	This river rises in the Knockmealdown Mountains and joins the Blackwater at Lismore. Satisfactory quality – ecological quality shows high status.	No change from 2012.

5. Long Term Trend Graphs – o-Phosphate








R.Nier
mean o-phosphate mg/l P
0.090
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0.060
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0.000
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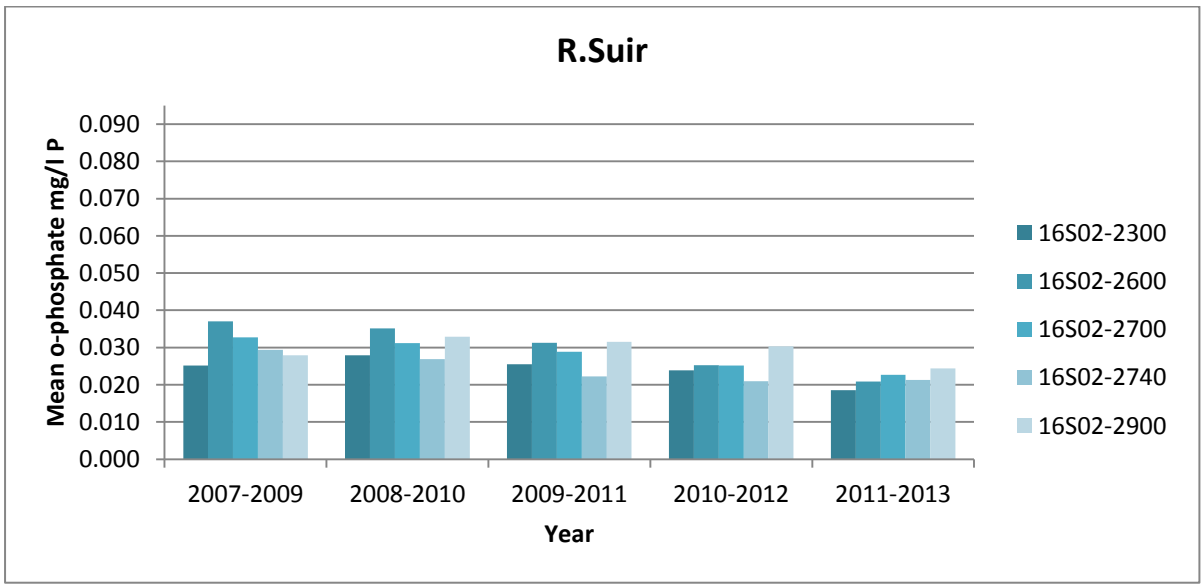
Year
16N01-0010
16N01-0100
16N01-0400


R.Suir
Mean o-phosphate mg/l P
0.090
0.080
0.070
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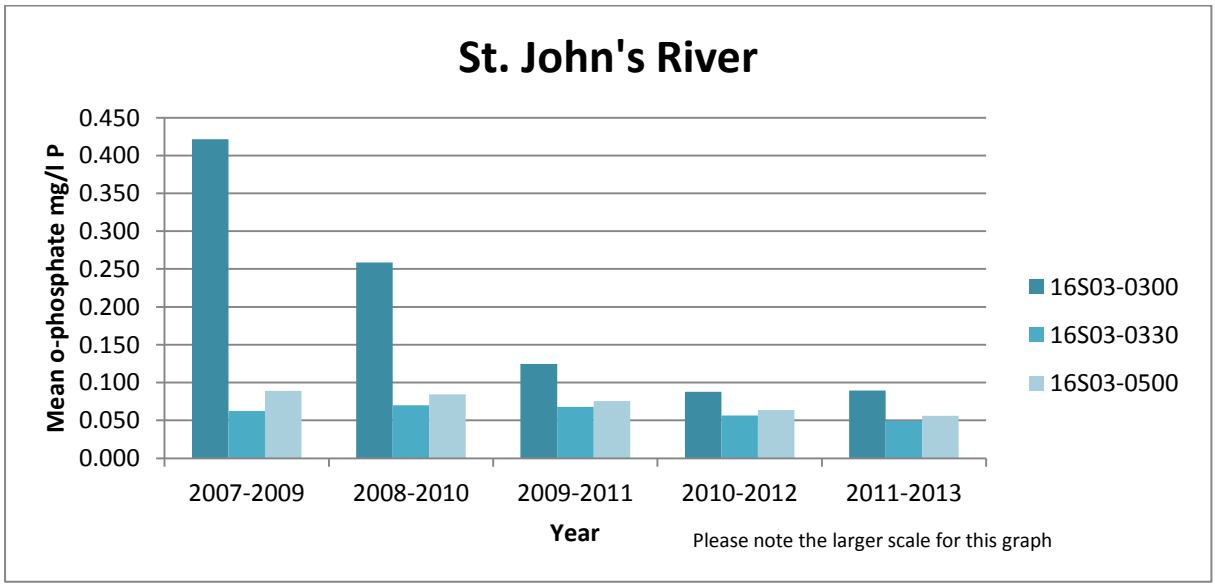
St. John's River
Mean o-phosphate mg/l P
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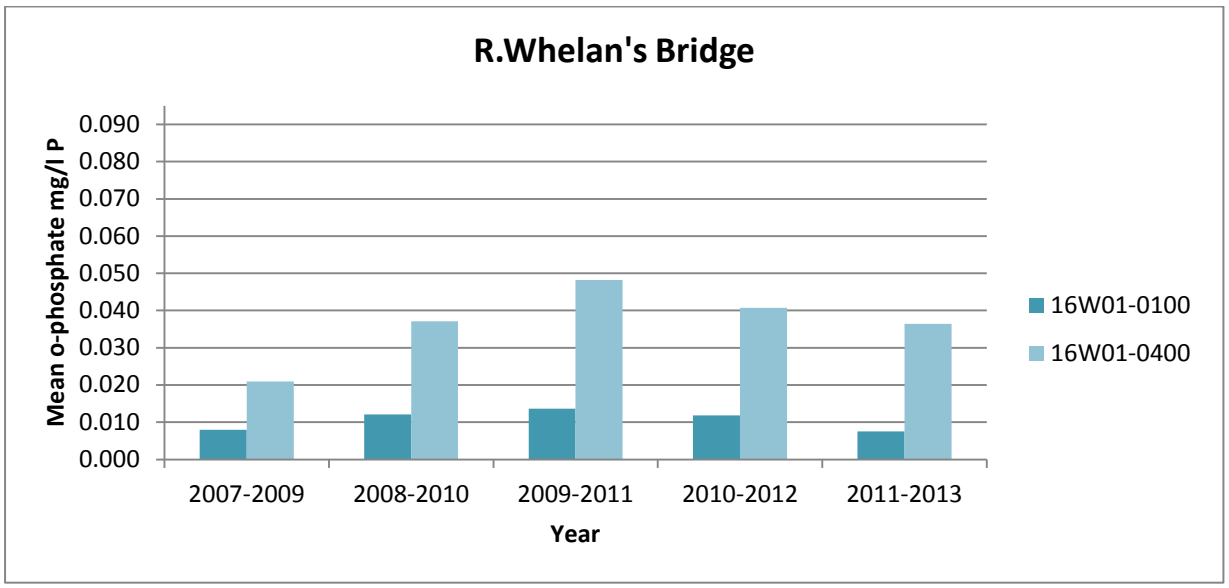
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
16S03-0300
16S03-0330
16S03-0500
Please note the larger scale for this graph


R.Whelan's Bridge
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
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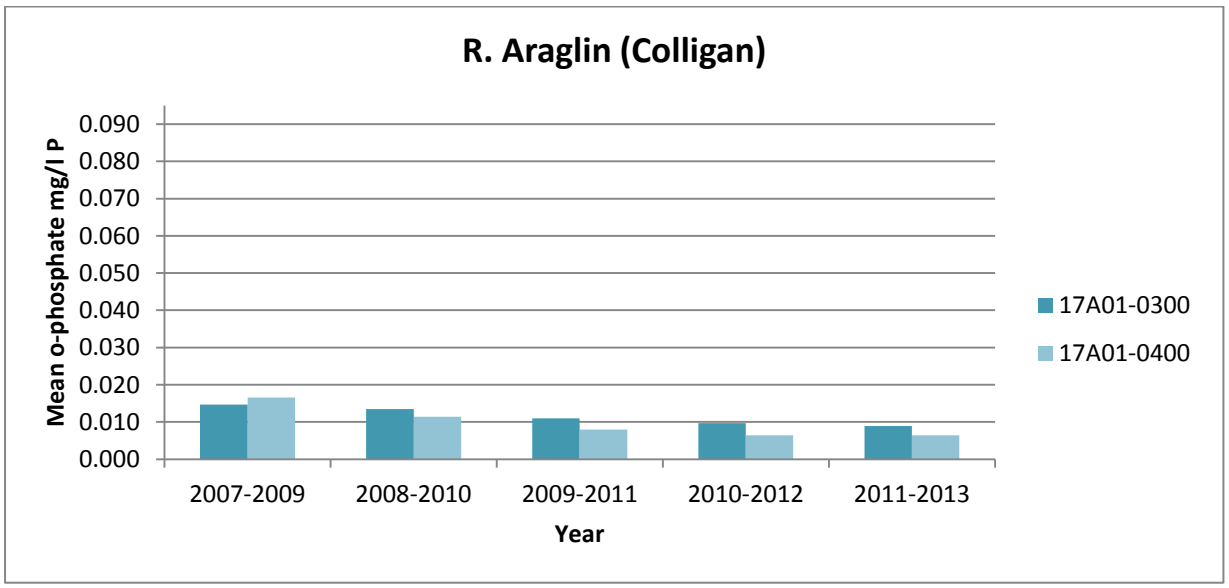
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
16W01-0100
16W01-0400


R. Araglin (Colligan)
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
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2007-2009
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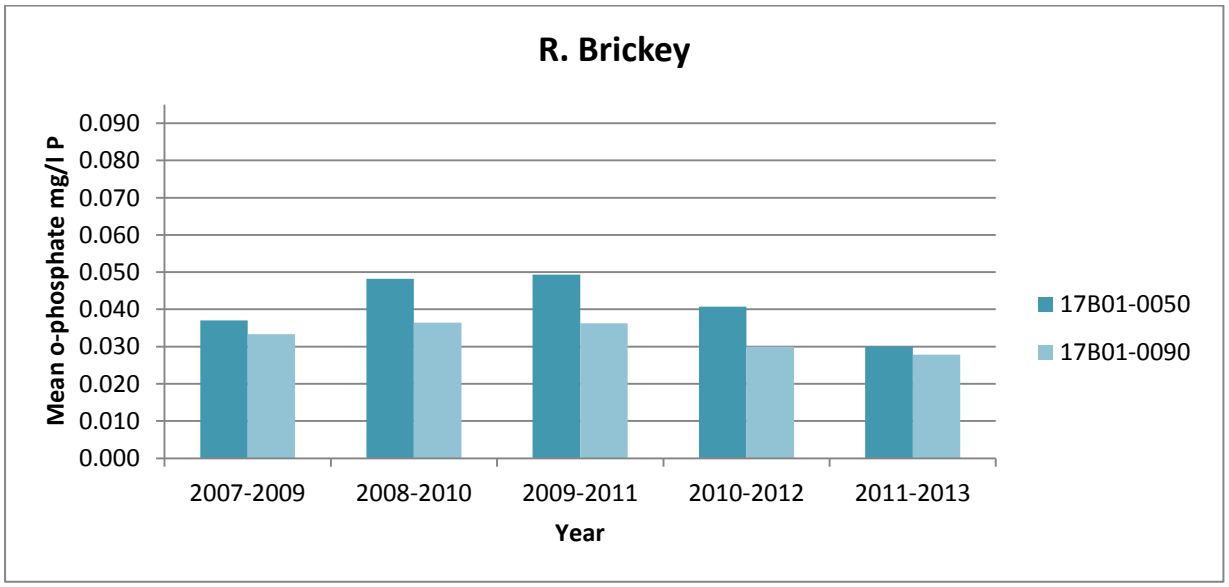
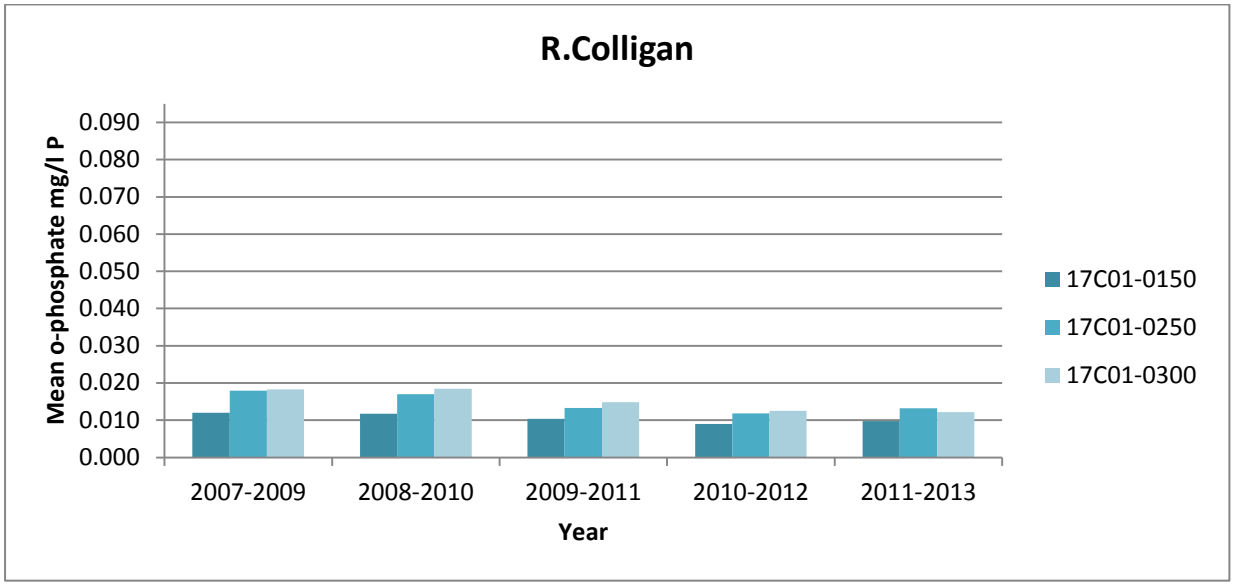
Year
17A01-0300
17A01-0400


R. Brickey
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17B01-0050
17B01-0090


R.Colligan
Mean o-phosphate mg/l P
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0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
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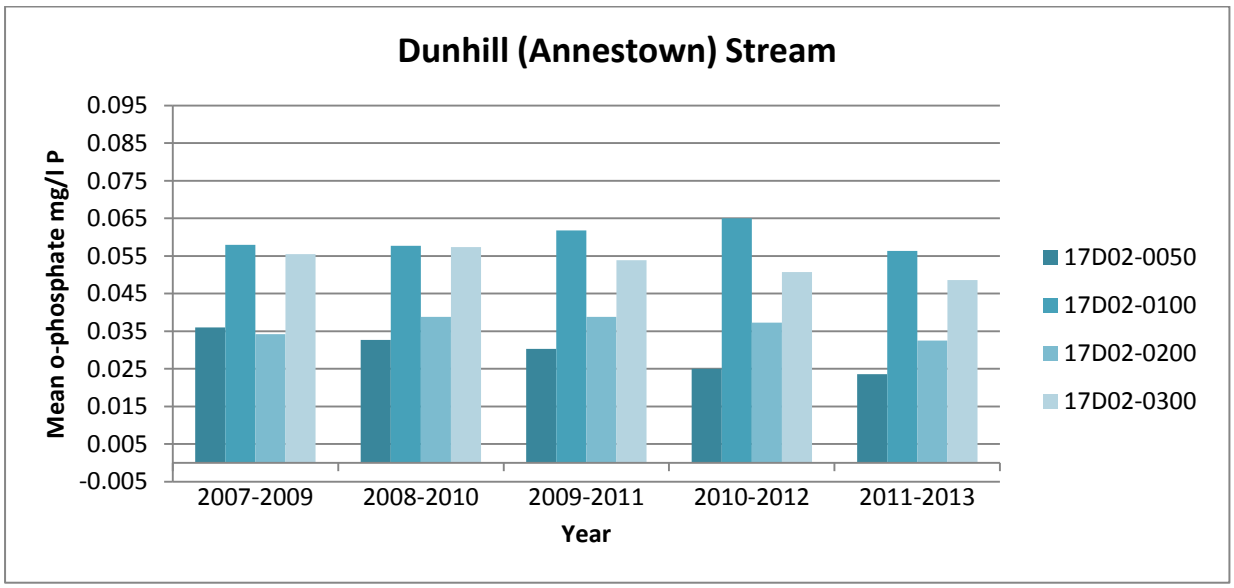
17C01-0250
17C01-0300


Dunhill (Annestown) Stream
Mean o-phosphate mg/l P
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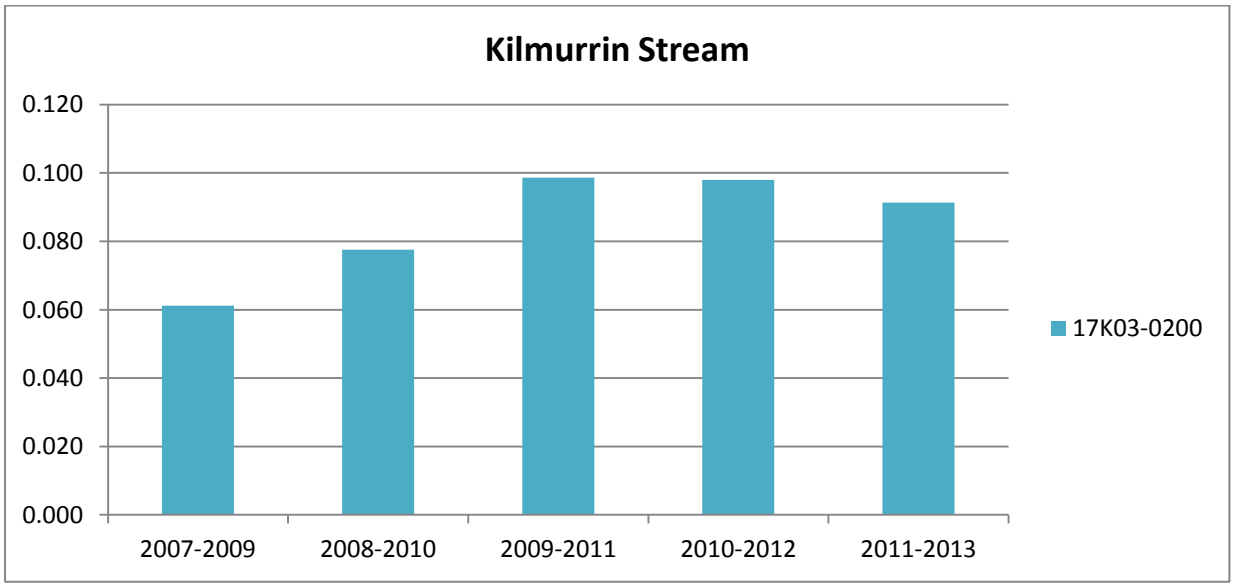
0.085
0.075
0.065
0.055
0.045
0.035
0.025
0.015
0.005
-0.005
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17D02-0050
17D02-0100
17D02-0200
17D02-0300


Kilmurrin Stream
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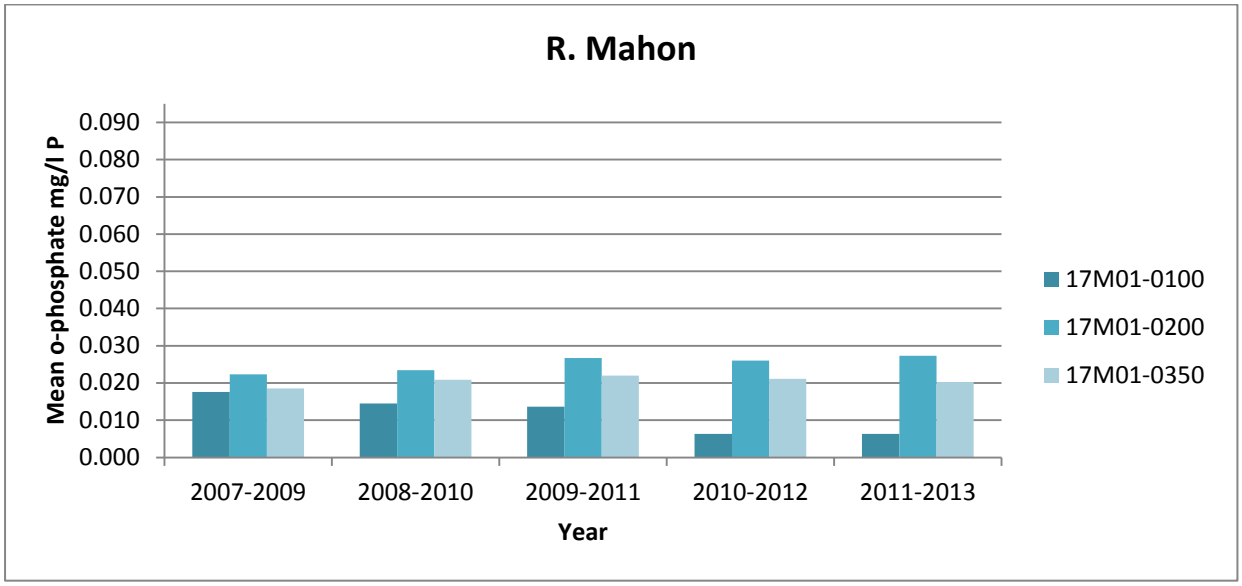
0.100
0.080
0.060
0.040
0.020
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
17K03-0200


R. Mahon
Mean o-phosphate mg/l P
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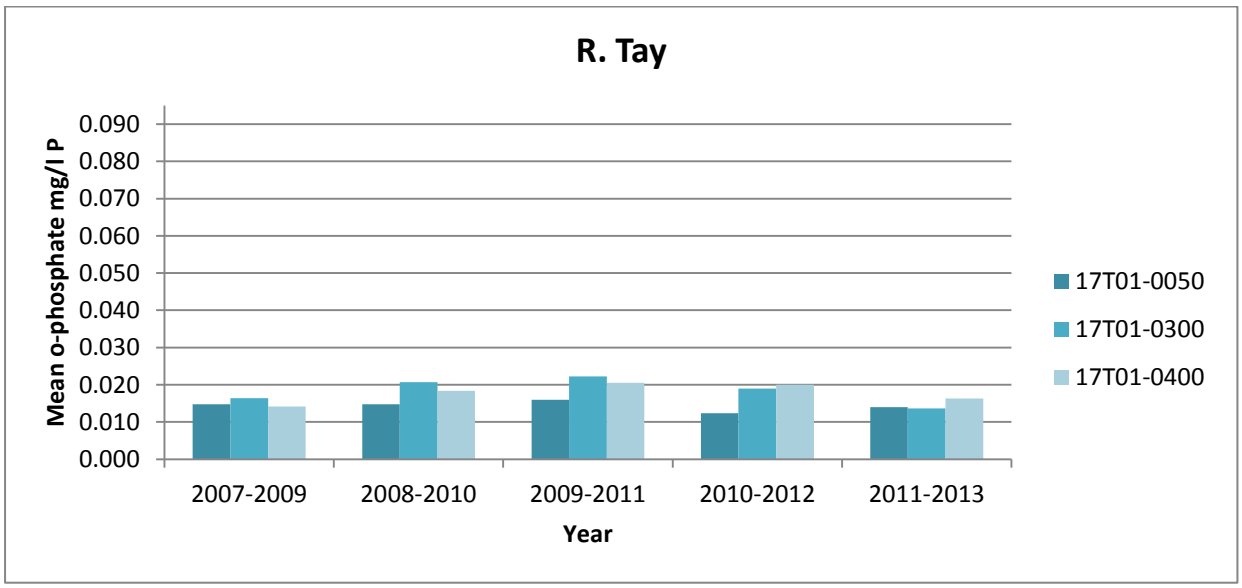
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17M01-0100
17M01-0200
17M01-0350


R. Tay
Mean o-phosphate mg/l P
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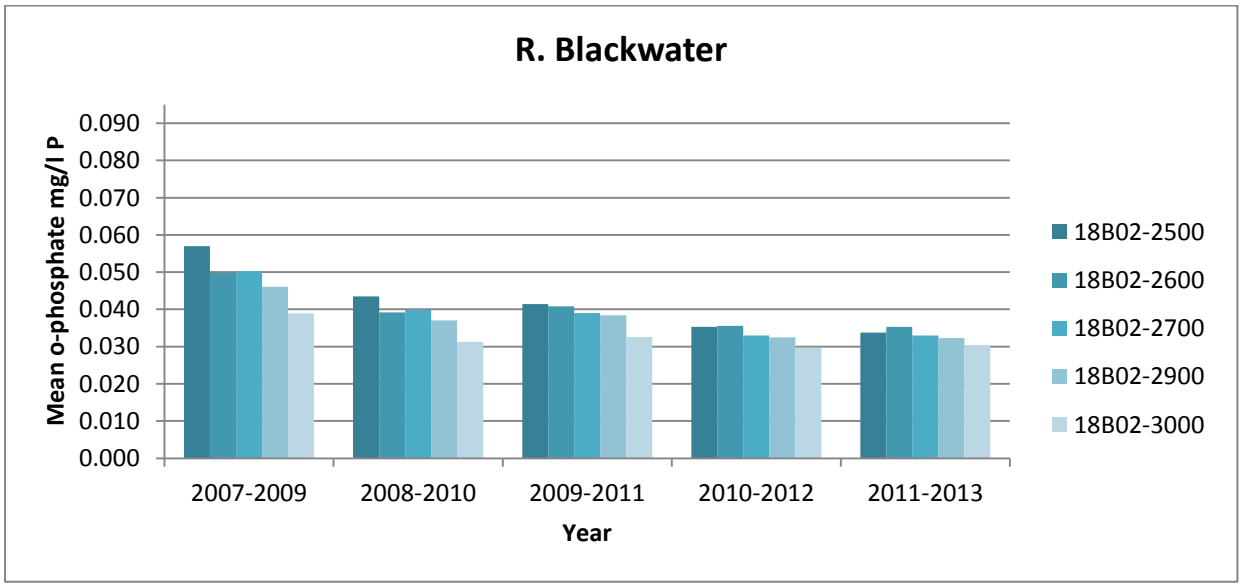
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17T01-0050
17T01-0300
17T01-0400


R. Blackwater
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
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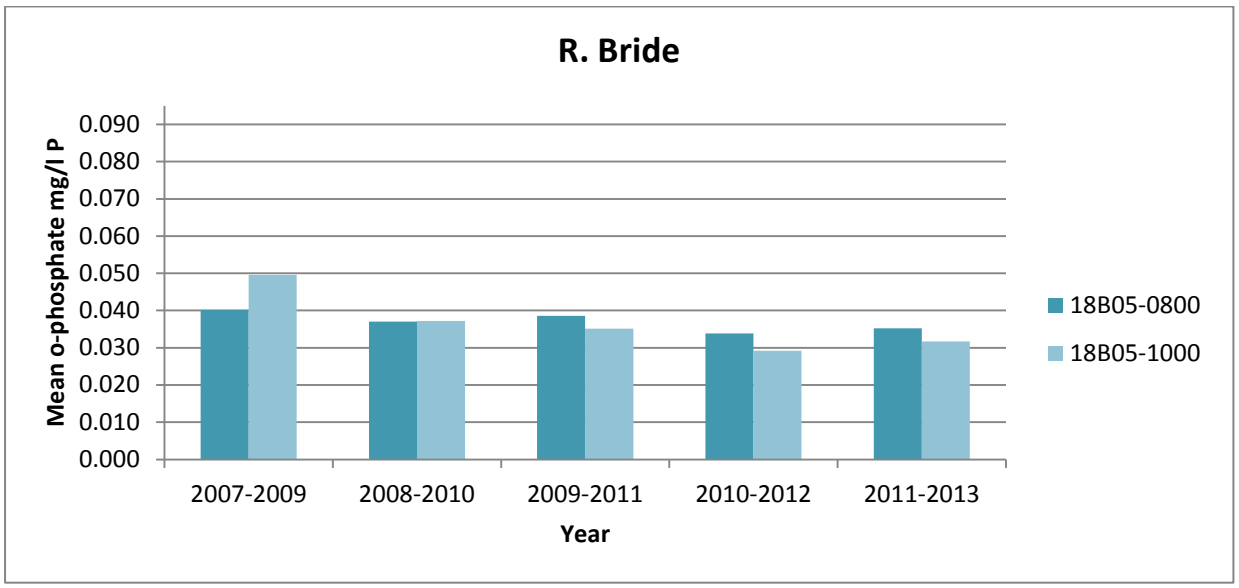
18B02-2600
18B02-2700
18B02-2900
18B02-3000


R. Bride
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
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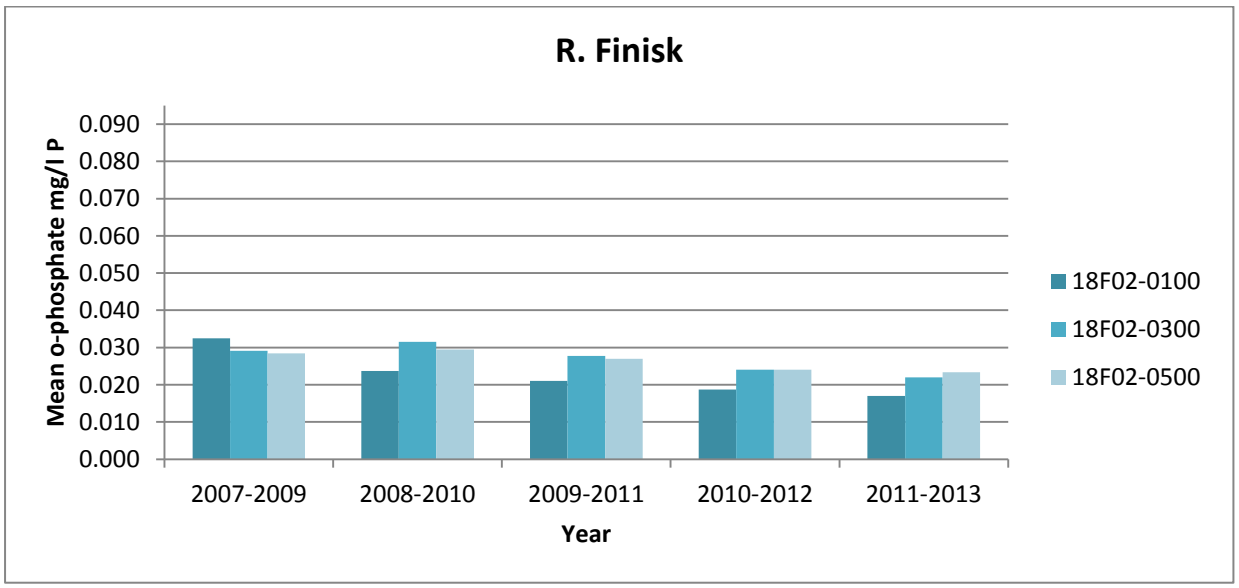
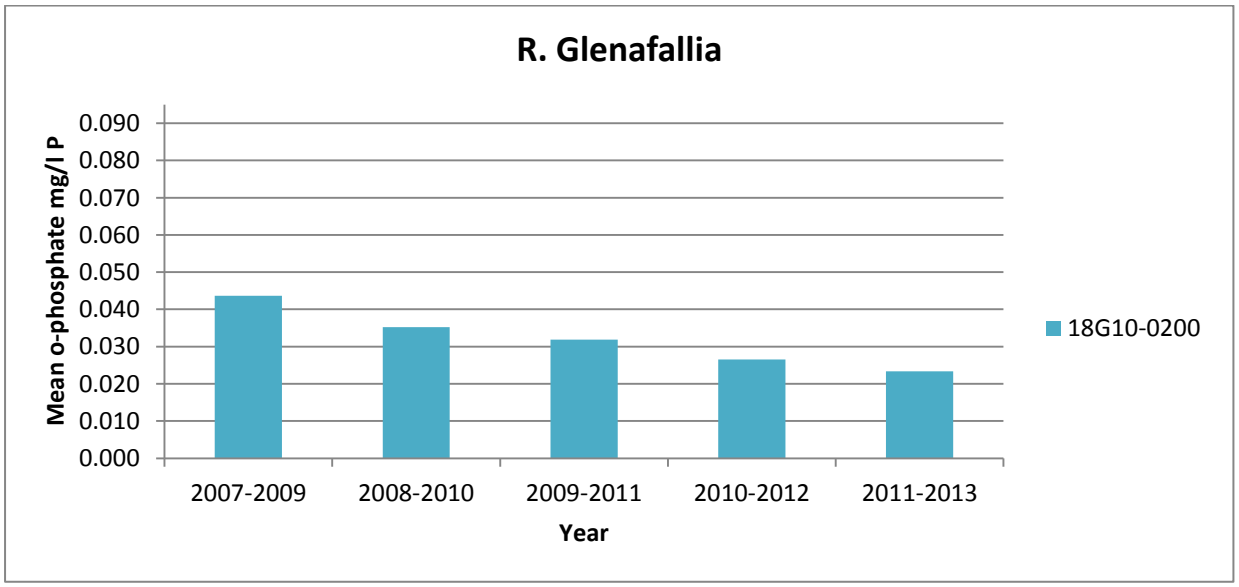
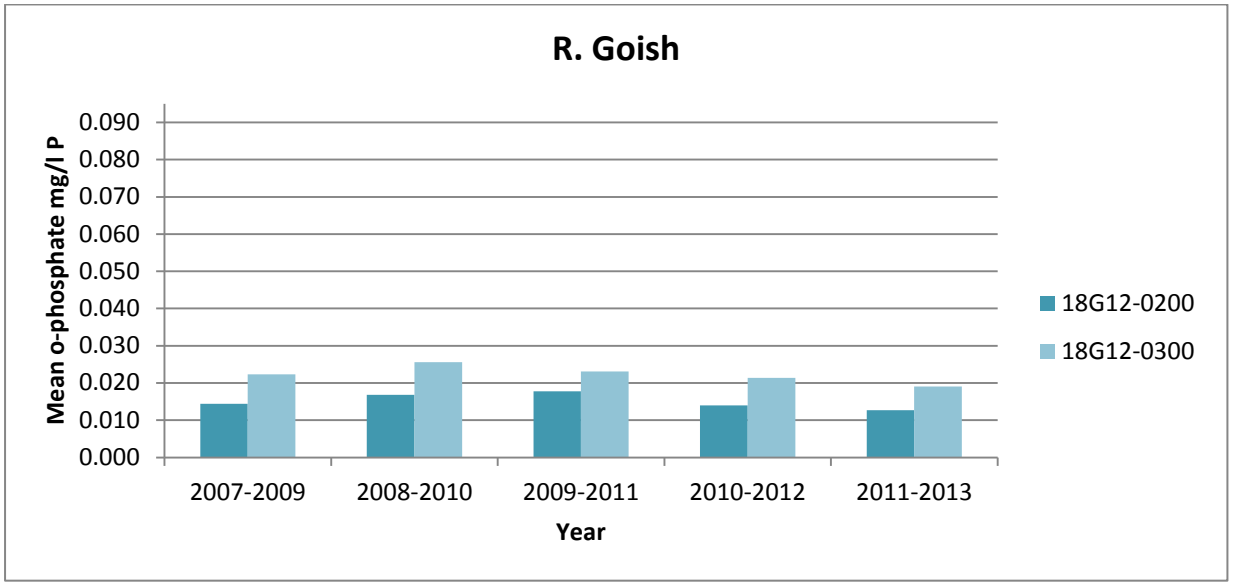
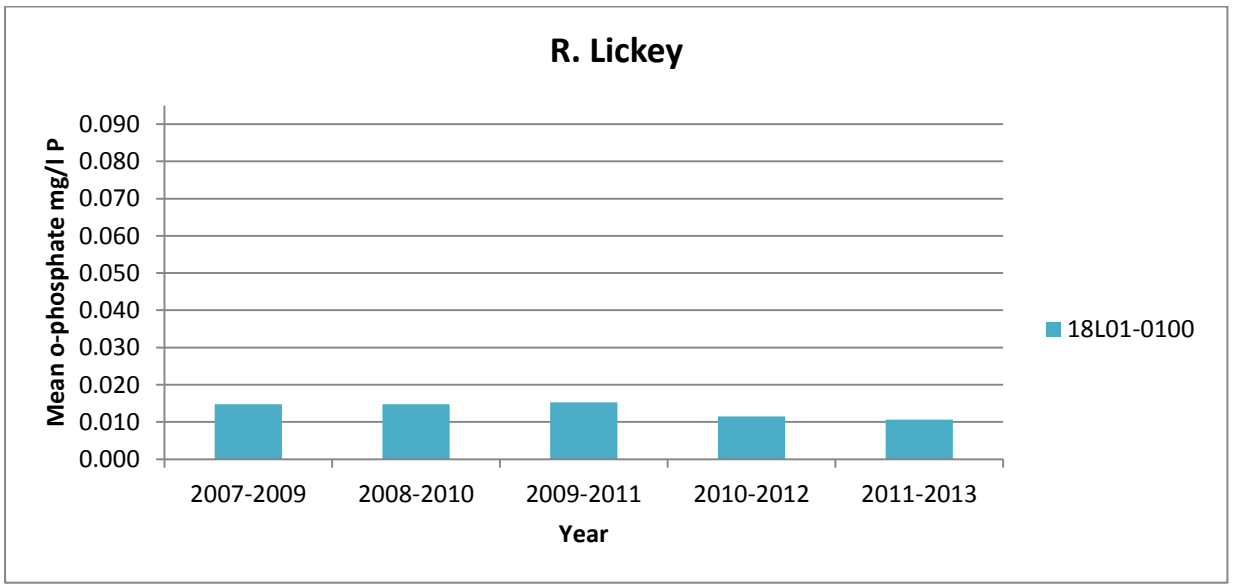
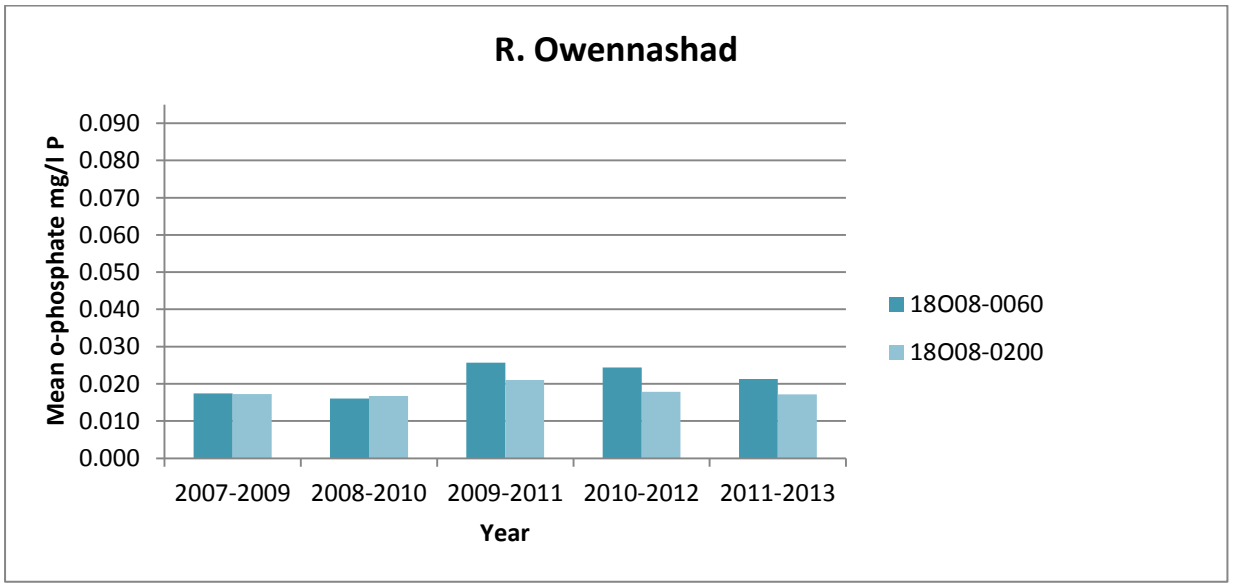
18B05-1000


R. Finisk
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18F02-0100
18F02-0300
18F02-0500

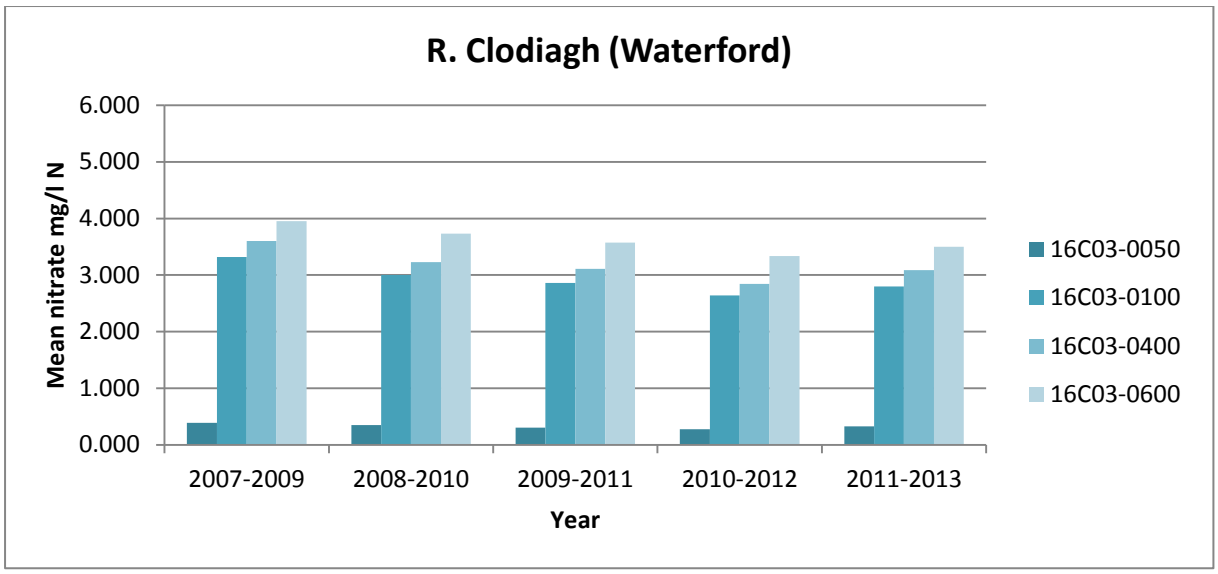

R. Glenafallia
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18G10-0200

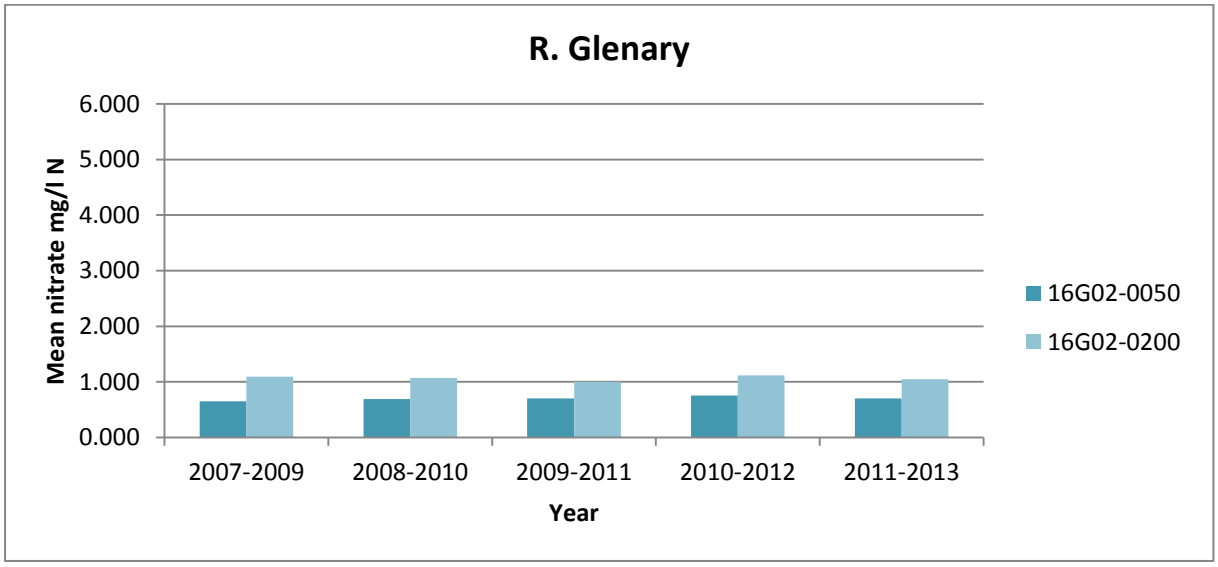

R. Goish
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18G12-0200
18G12-0300

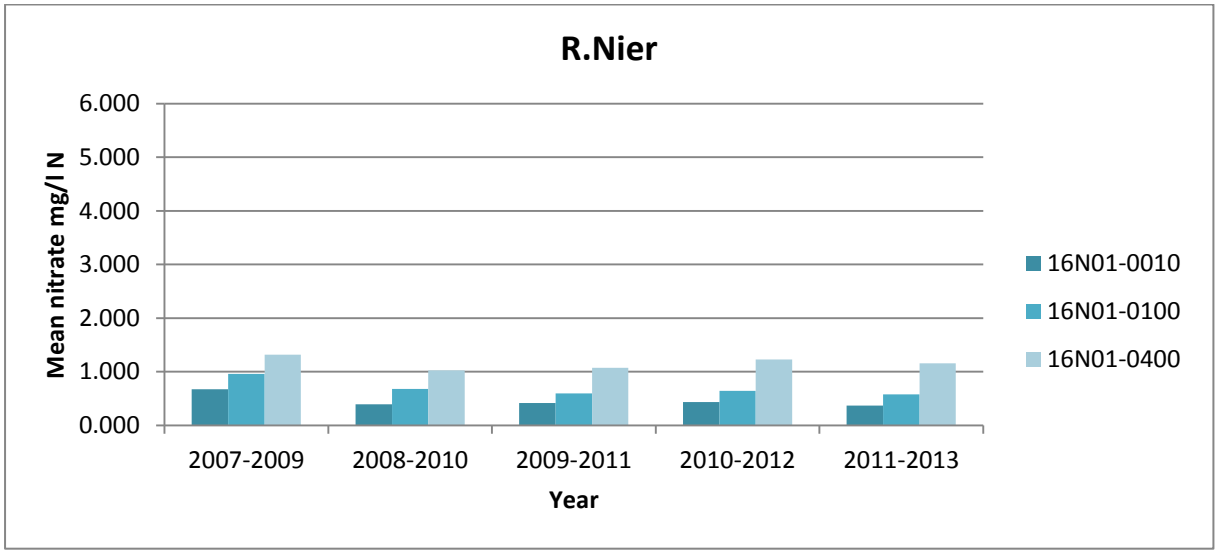

R. Lickey
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18L01-0100

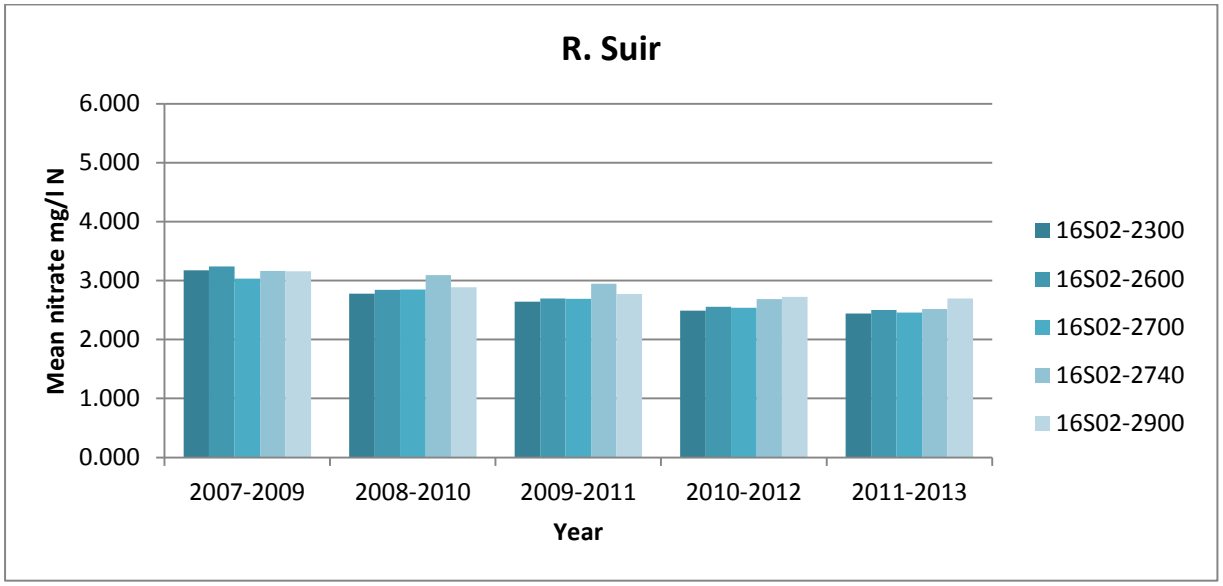

R. Owennashad
Mean o-phosphate mg/l P
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18O08-0060
18O08-0200

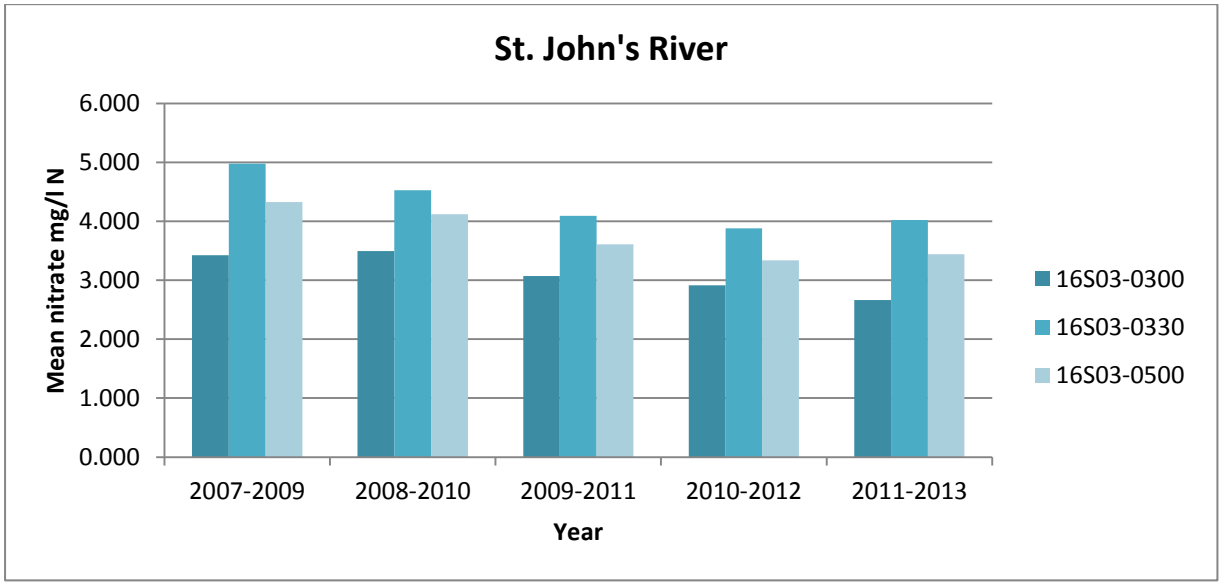
6. Long Term Trend Graphs – Nitrate

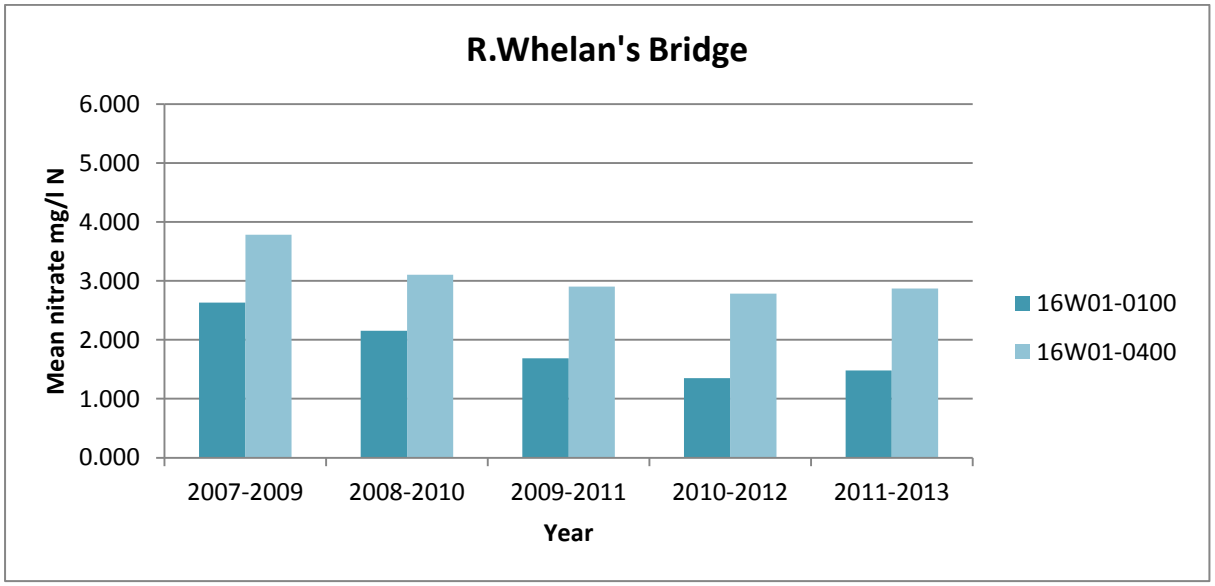


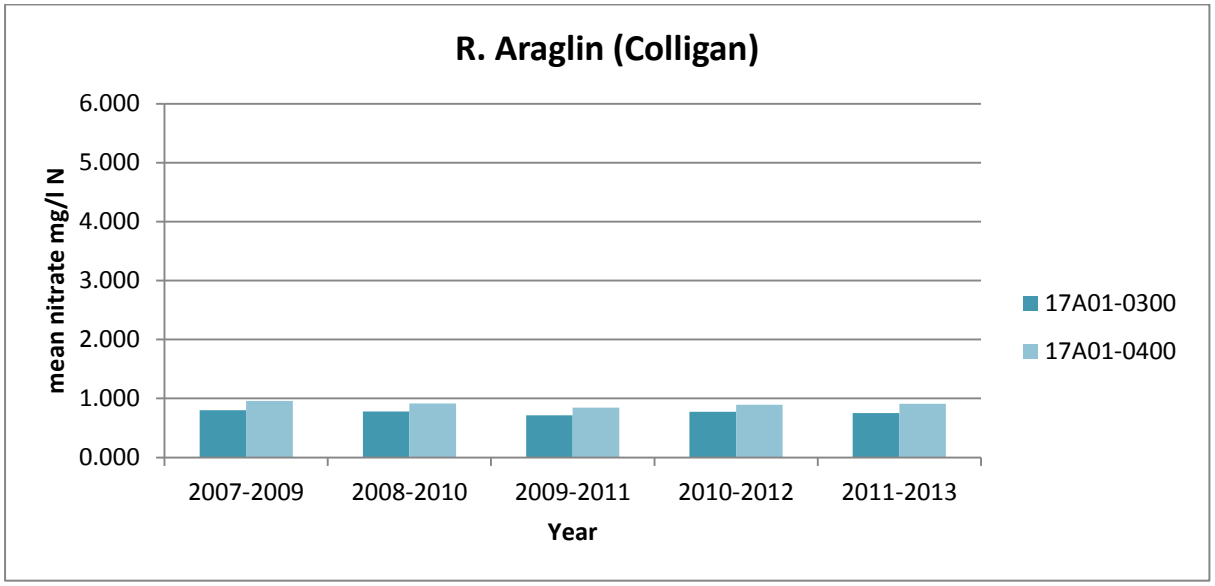


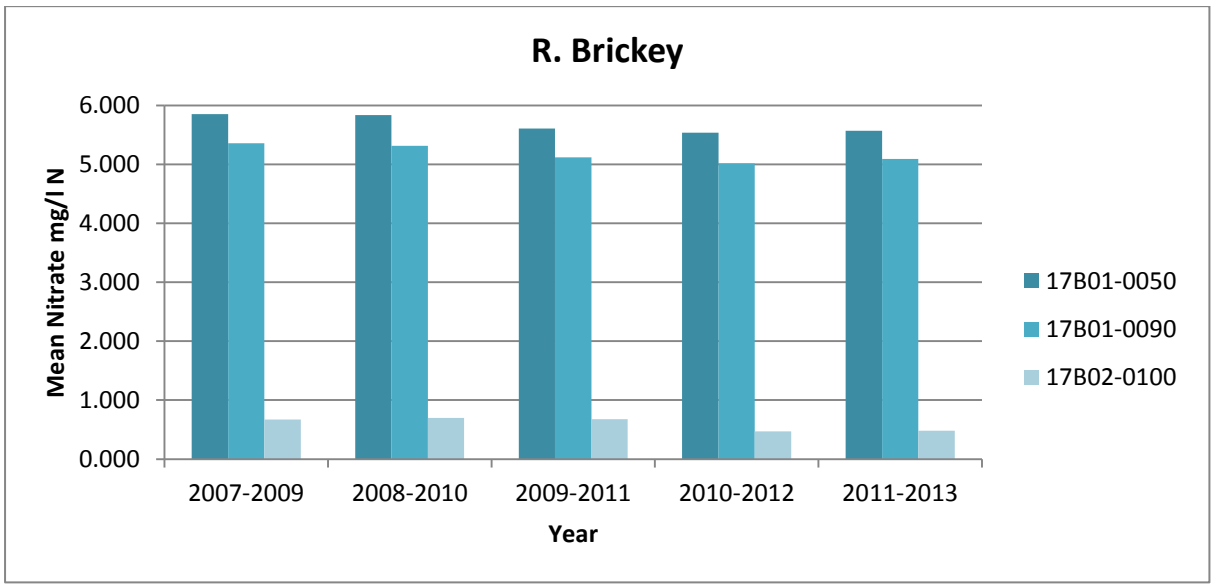


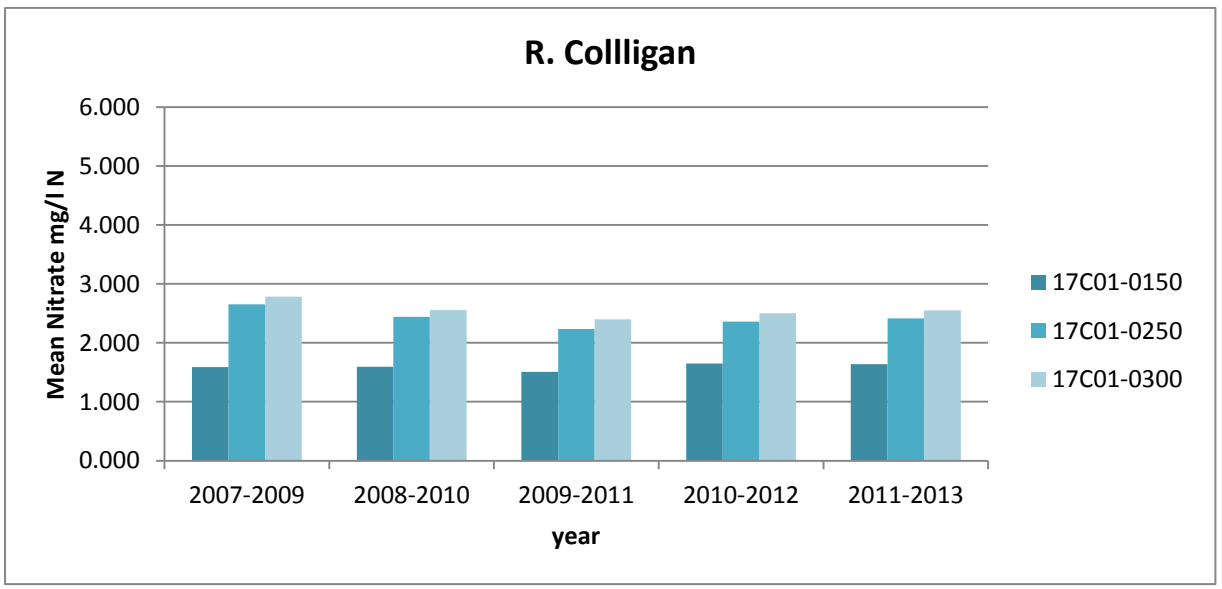

R. Suir
Mean nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
16S02-2300
16S02-2600
16S02-2700
16S02-2740
16S02-2900

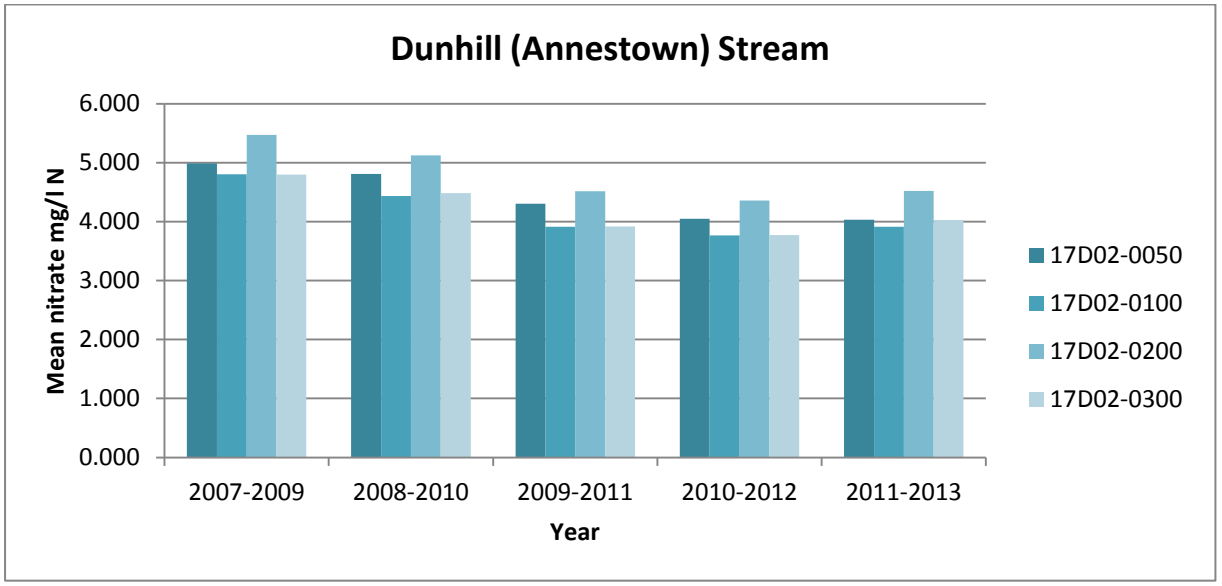

St. John's River
Mean nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
16S03-0300
16S03-0330
16S03-0500

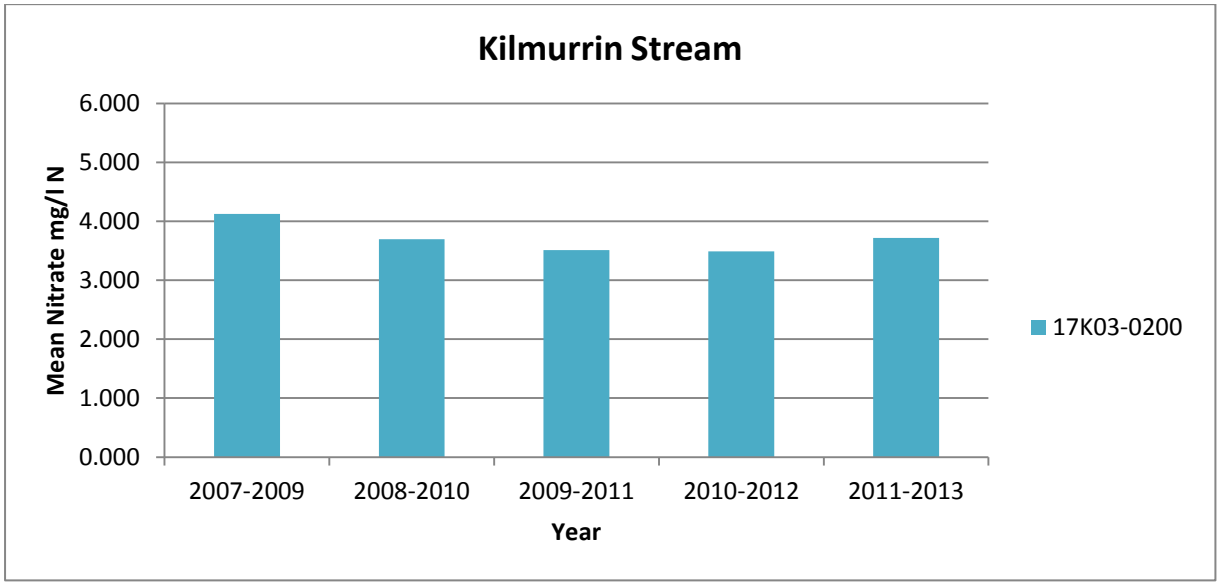

R.Whelan's Bridge
Mean nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
16W01-0100
16W01-0400

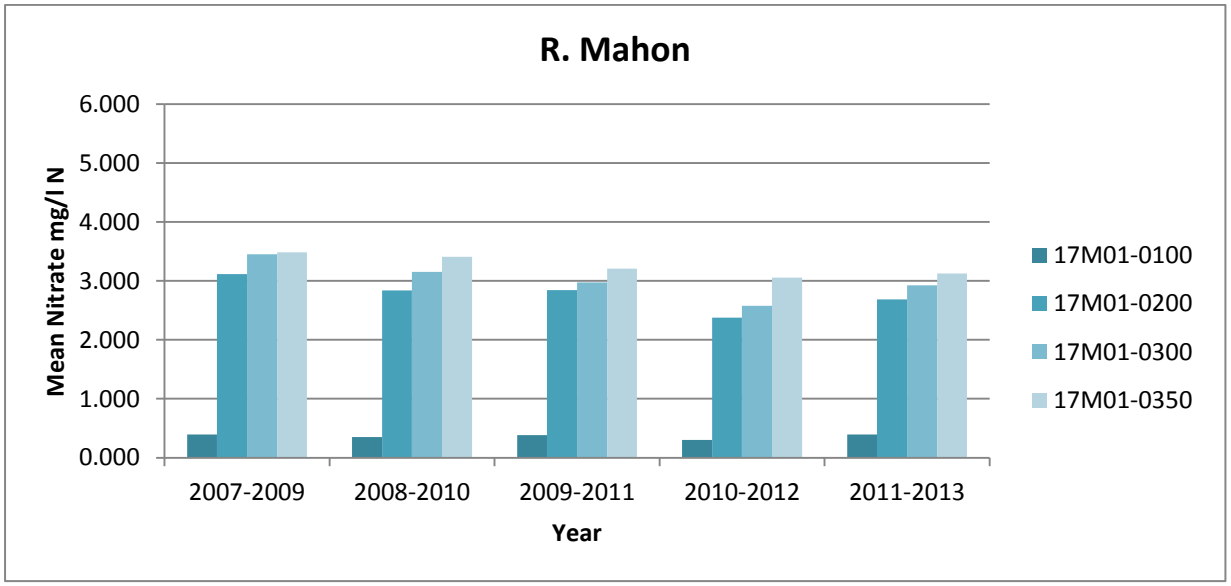

R. Araglin (Colligan)
mean nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17A01-0300
17A01-0400

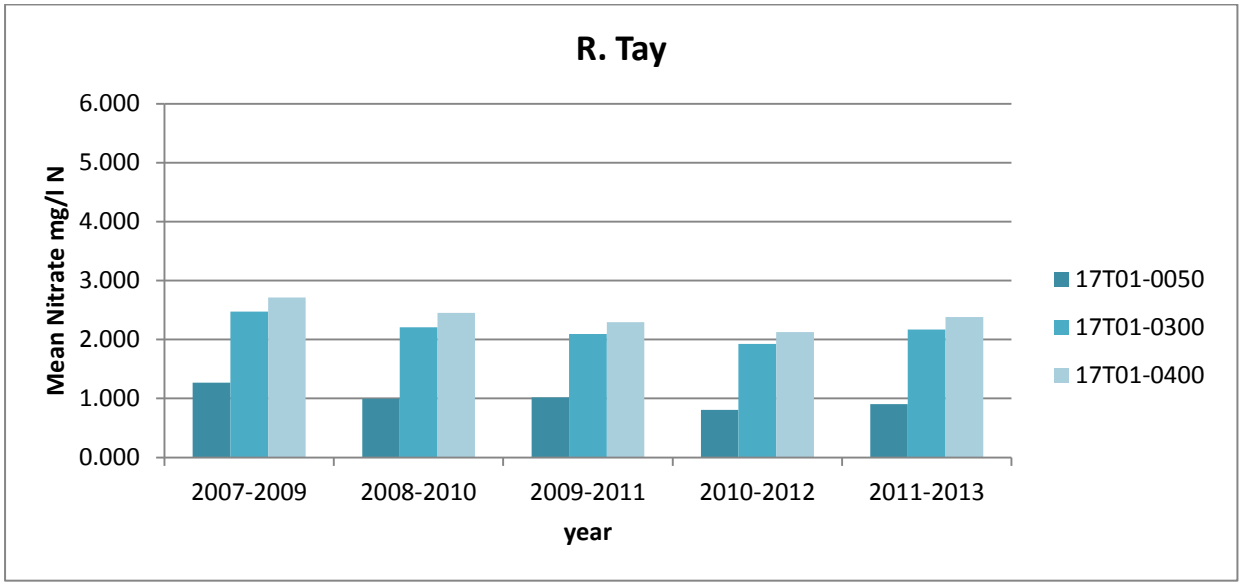

R. Brickey
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17B01-0050
17B01-0090
17B02-0100

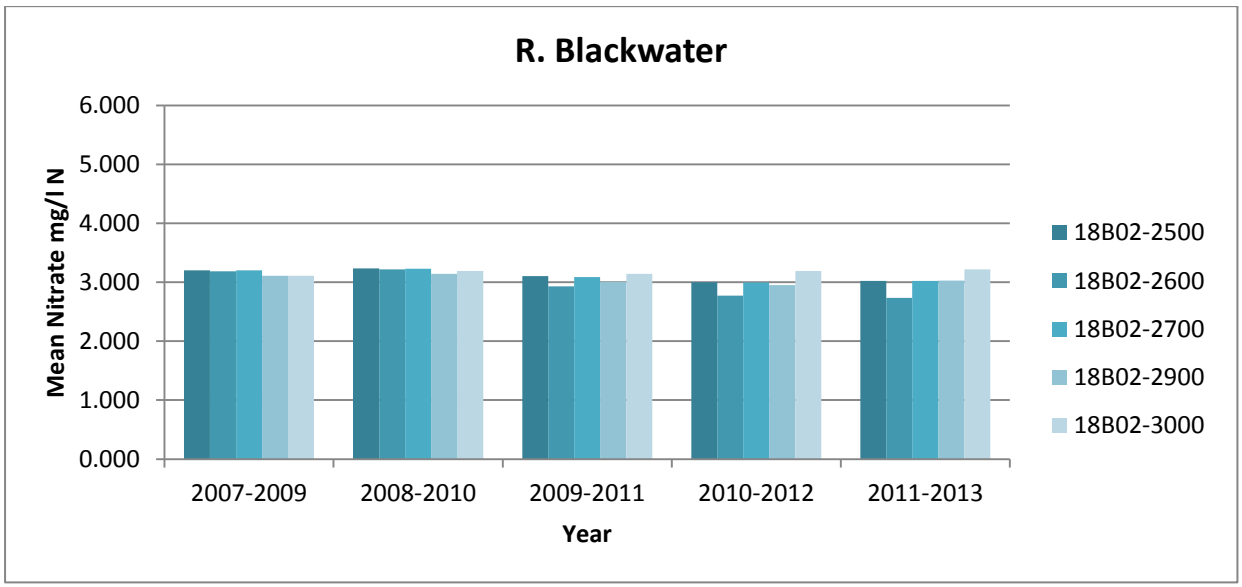

R. Collligan
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
year
17C01-0150
17C01-0250
17C01-0300

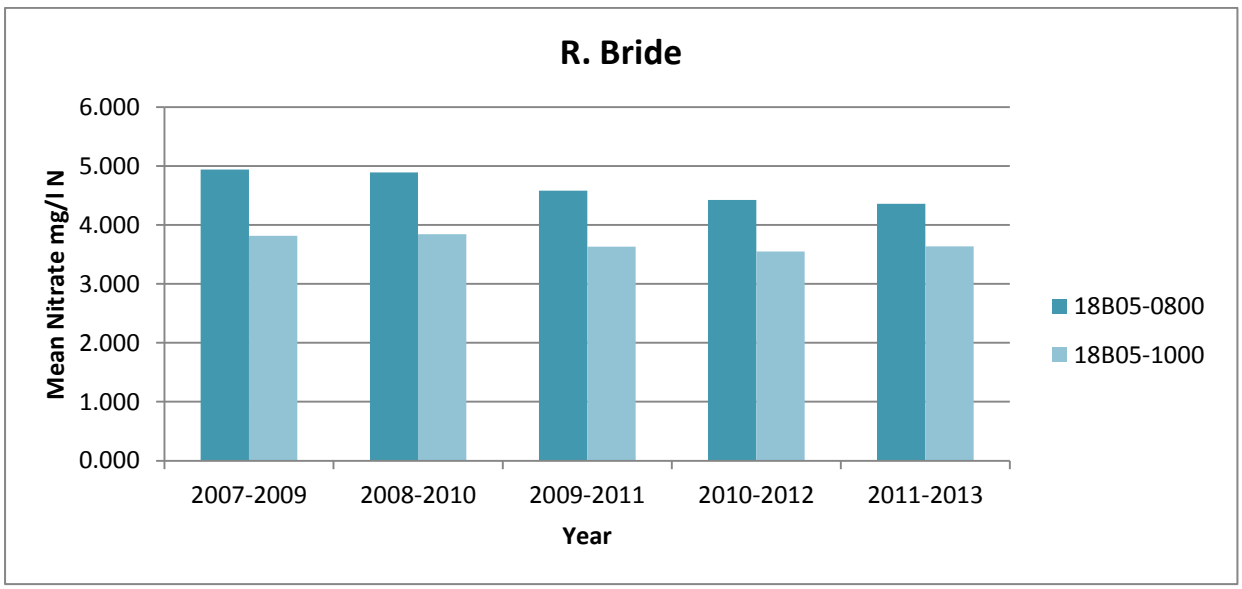

Dunhill (Annestown) Stream
Mean nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17D02-0050
17D02-0100
17D02-0200
17D02-0300

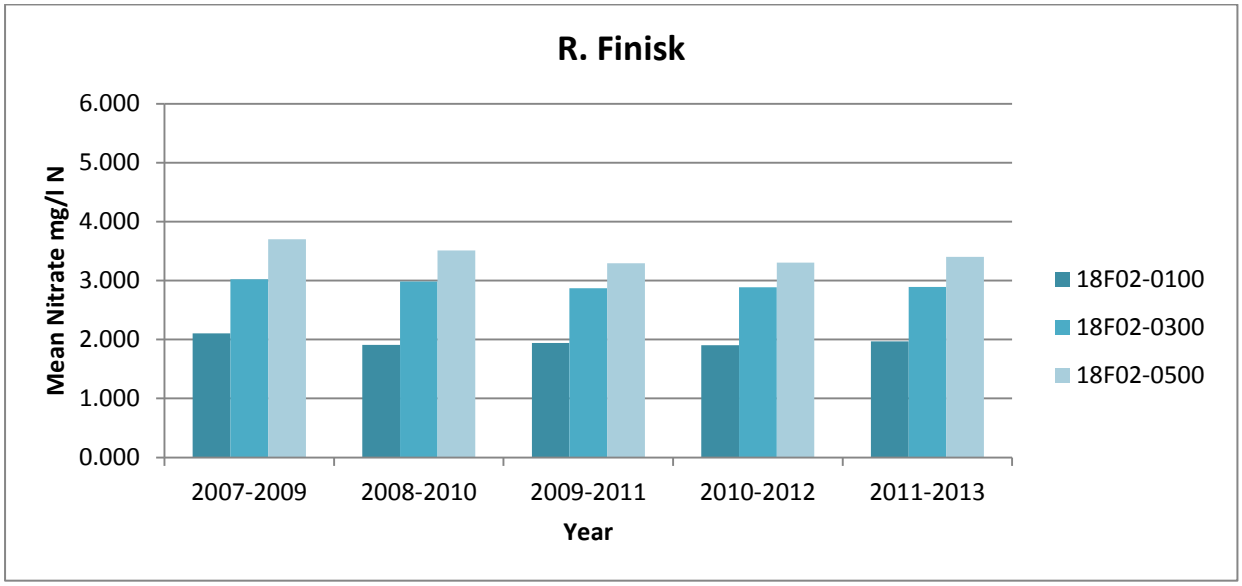

Kilmurrin Stream
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17K03-0200

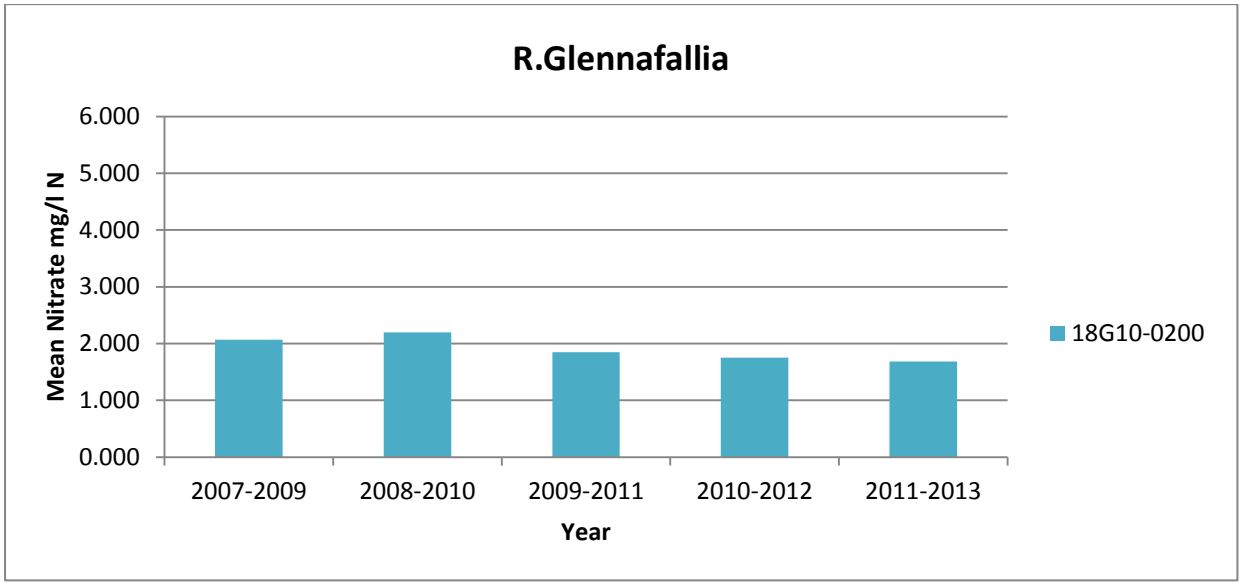

R. Mahon
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
17M01-0100
17M01-0200
17M01-0300
17M01-0350

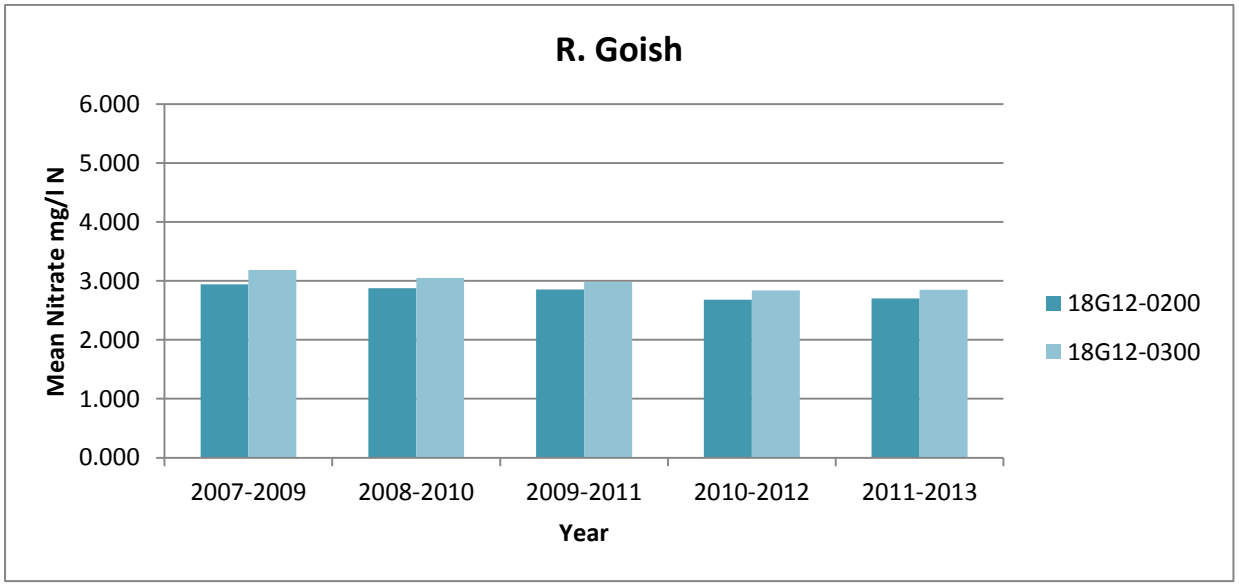

R. Tay
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
year
17T01-0050
17T01-0300
17T01-0400

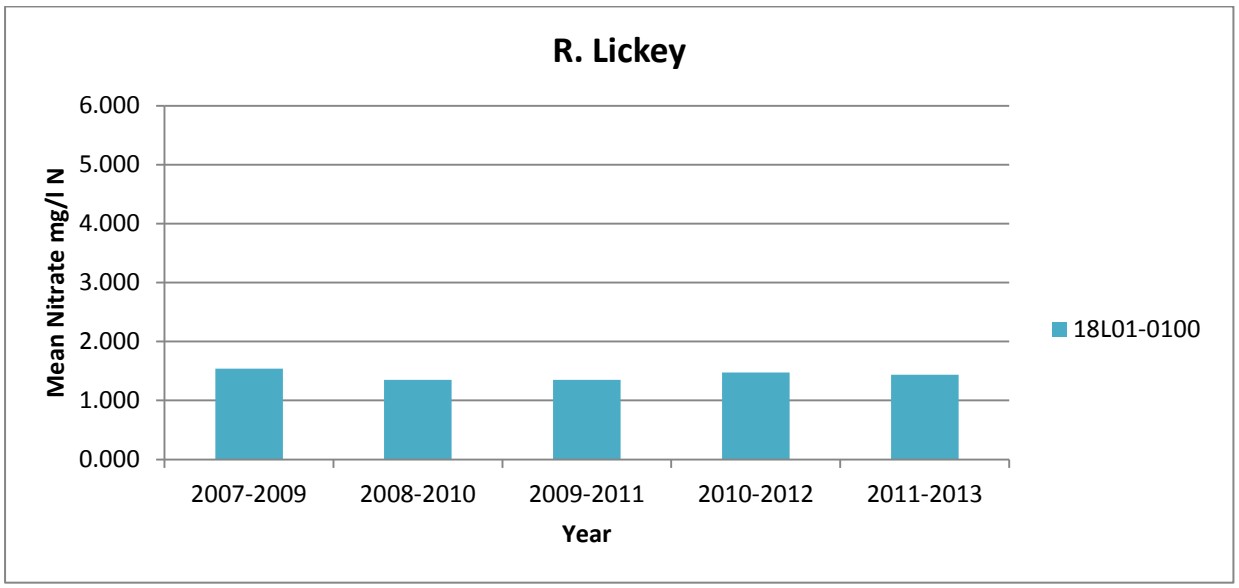

R. Blackwater
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18B02-2500
18B02-2600
18B02-2700
18B02-2900
18B02-3000

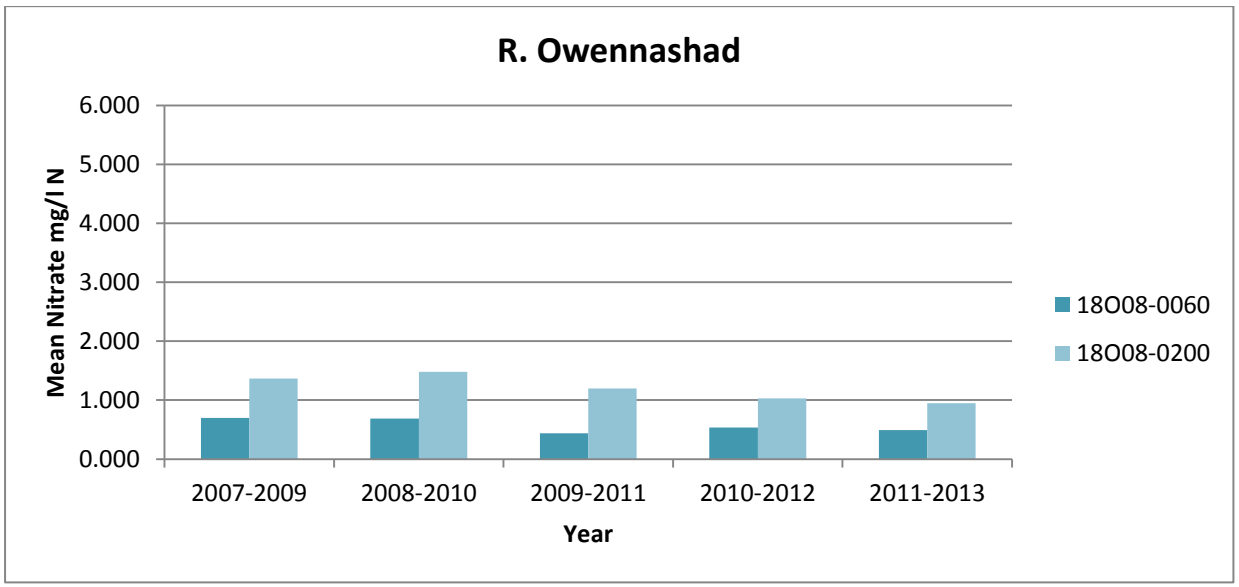

R. Bride
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18B05-0800
18B05-1000


R. Finisk
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18F02-0100
18F02-0300
18F02-0500


R.Glennafallia
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18G10-0200

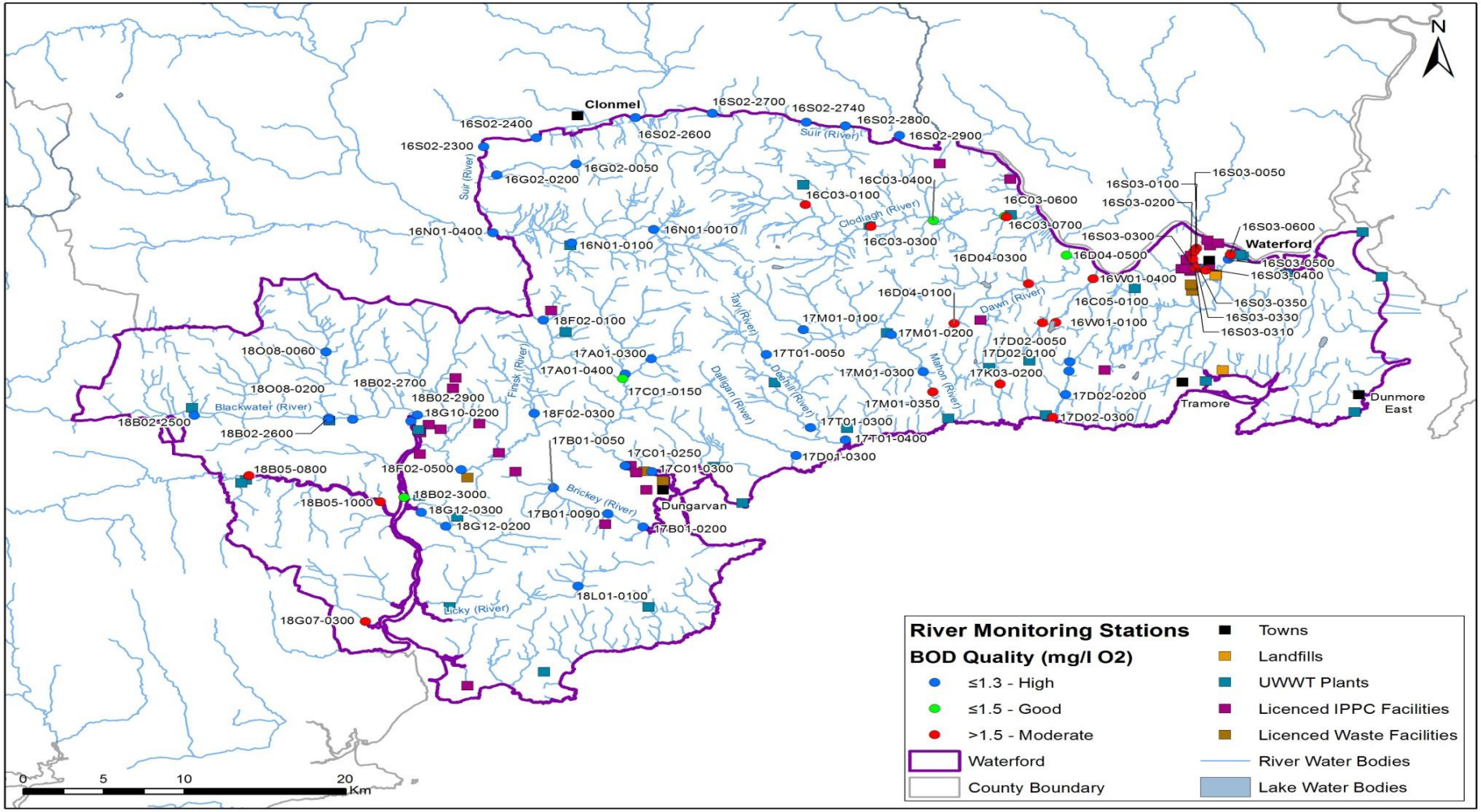

R. Goish
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18G12-0200
18G12-0300


R. Lickey
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18L01-0100

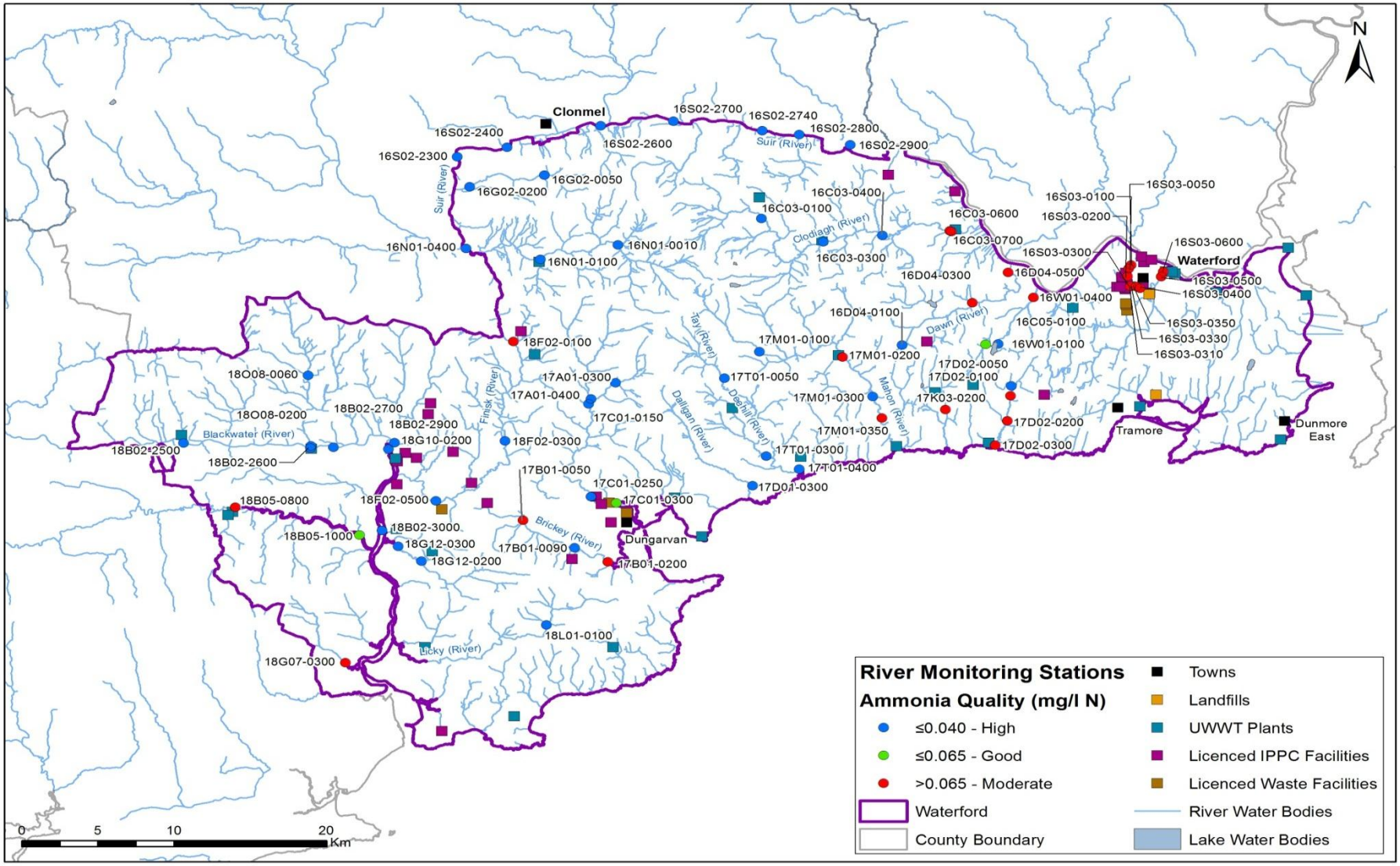

R. Owennashad
Mean Nitrate mg/l N
6.000
5.000
4.000
3.000
2.000
1.000
0.000
2007-2009
2008-2010
2009-2011
2010-2012
2011-2013
Year
18O08-0060
18O08-0200

7. River Water Quality Maps

Map 1. River Water Quality: Waterford BOD assessment 2013



Map 2. River Water Quality: Waterford ammonia assessment 2013


N
Clonmel
Waterford
Dungarvan
Tramore
Dunmore East
Suir (River)
Clodiagh (River)
Tay (River)
Dawn (River)
Finisk (River)
Dalligan (River)
Deghil (River)
Mahon (River)
Blackwater (River)
Brickey (River)
Licky (River)
16S02-2400
16S02-2300
16S02-2700
16S02-2740
16S02-2800
16S02-2600
16S02-2900
16G02-0050
16G02-0200
16C03-0400
16C03-0100
16C03-0600
16C03-0700
16C03-0300
16N01-0400
16N01-0010
16N01-0100
16D04-0300
16D04-0500
16D04-0100
16W01-0400
16W01-0100
16C05-0100
16S03-0050
16S03-0100
16S03-0200
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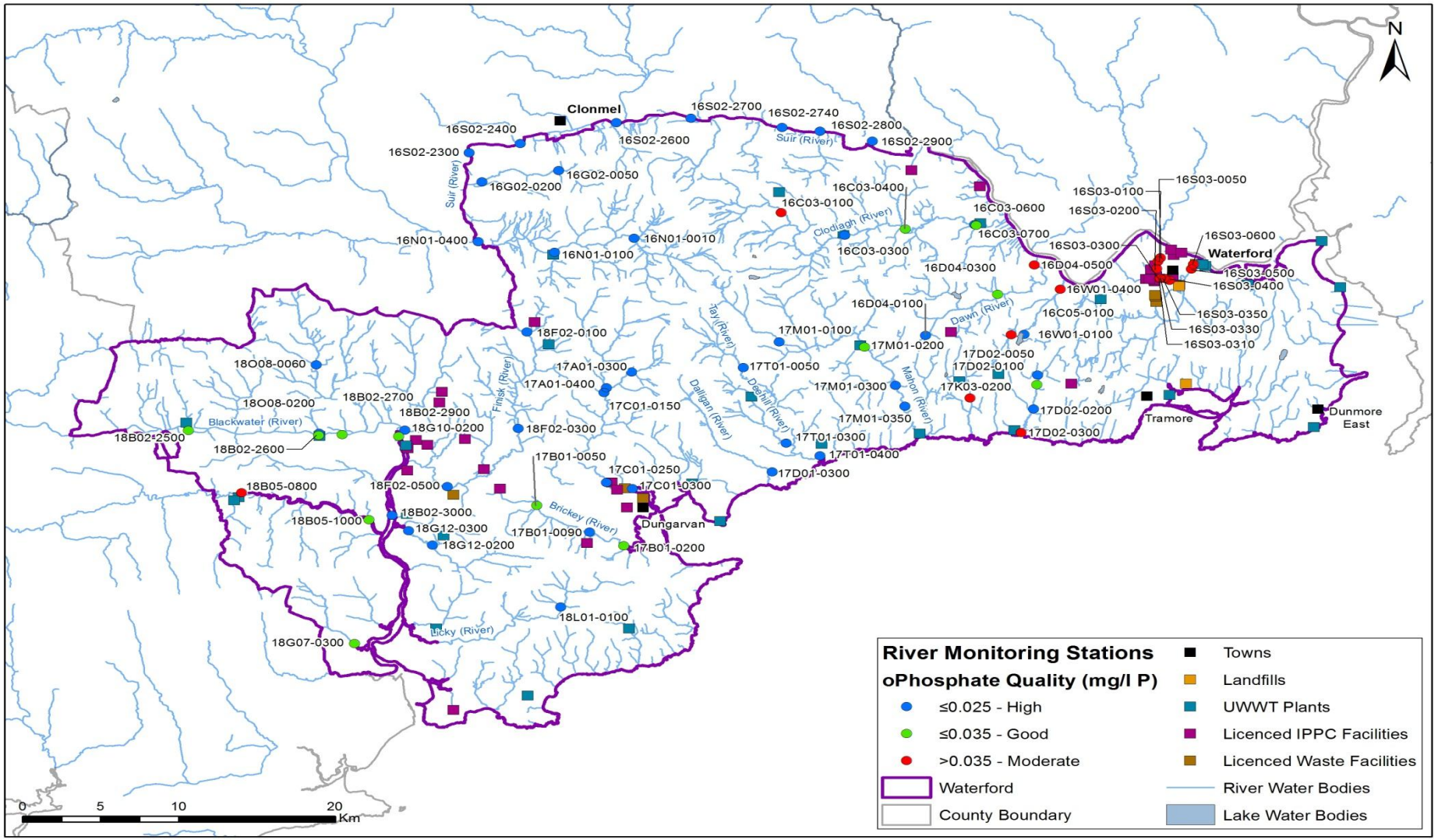
16S03-0300
16S03-0500
16S03-0400
16S03-0350
16S03-0330
16S03-0310
18F02-0100
18O08-0060
18O08-0200
18B02-2700
18B02-2900
18B02-2500
18B02-2600
18G10-0200
18F02-0300
17A01-0300
17A01-0400
17C01-0150
17T01-0050
17M01-0100
17M01-0200
17M01-0300
17M01-0350
17T01-0300
17T01-0400
17D01-0300
17D02-0050
17D02-0100
17K03-0200
17D02-0200
17D02-0300
17B01-0050
17C01-0250
17C01-0300
18F02-0500
18B05-0800
18B05-1000
18B02-3000
18G12-0300
18G12-0200
17B01-0090
17B01-0200
18L01-0100
18G07-0300
0
5
10
20
Km
River Monitoring Stations
Ammonia Quality (mg/l N)
≤0.040 - High
≤0.065 - Good
>0.065 - Moderate
Waterford
County Boundary
Towns
Landfills
UWWT Plants
Licenced IPPC Facilities
Licenced Waste Facilities
River Water Bodies
Lake Water Bodies

Map 3. River Water Quality: Waterford ortho-phosphate assessment 2013



Map 4. River Water Quality: Waterford total oxidised nitrogen (TON) assessment 2013