Scottish Environment Protection Agency

NATIONAL WATER QUALITY CLASSIFICATION 2004

Summary

This report summarises the results of SEPA's monitoring of water quality in Scotland's rivers, estuaries and coastal waters in 2004. It also provides longer-term trend information, particularly in respect of SEPA's water quality targets for 2006, which were set in 2000 on the basis of water quality in 1999.

The results for 2004 demonstrate continuing substantial quality improvements in rivers and coastal waters, with some expected short-term downgrading of local coastal waters due to particular weather conditions. Overall, the 2006 quality targets have been met well ahead of schedule, and further improvements can be anticipated.

Rivers

The net length of poor quality rivers and streams in classes C & D was reduced by a further 36 km in 2004, giving a total reduction of **402 km** since 1999. There was some concern last year that the large improvement made in 2003 may have been significantly helped by the dry summer of that year, so to achieve further progress despite some relatively wet weather in summer 2004 is particularly encouraging. It is now clear that the improvement target for the period 1999 – 2006, a **351 km** reduction in class C&D waters, should be comfortably exceeded. Many of the improvements are a direct result of infrastructure investments made by Scottish Water, SEPA actions via Environmental Improvement Plans (EIP), and work with and through other organisations such as the Coal Authority and farming community.

Despite the very positive progress in improving river water quality made since 1999, substantial lengths of poor quality water remain. These include numerous stretches originally targeted to be improved by 2006, and work to achieve upgrades is continuing. Conversely, numerous improvements have been achieved for watercourses which, when the targets were set in 2000, were not expected to improve by 2006. These include very welcome Coal Authority work to intercept and treat previously polluting mine water arisings prior to their discharge to watercourses. Among the planned improvements seen in 2004 have been further significant upgrading of wastewater infrastructures and industrial premises, with some step changes in water quality due to the closure of wastewater treatment works and diversion of effluent to newer/larger works elsewhere.

Estuaries

The net estuarine area in the unsatisfactory classes C & D decreased by 6.8 km^2 in 2004, giving a total reduction of **11.4 km^2** since 1999. On a headline basis, these waters have therefore exceeded the improvement target for the period 1999 – 2006, which is to achieve a **6.5 km^2** reduction. However, in the important Forth and Clyde estuaries, water quality is significantly dependent on river flow. The 2002 improvement was assisted by the wet summer of that year, and as expected the dry weather of 2003 partly reversed this trend. The summer of 2004 again brought wet weather and this aided estuarine water quality. However, continuing investments by Scottish Water and industrial dischargers are delivering cleaner waters, with recent improvements in the Tay being particularly notable, and the long-term trend as shown by Figure 3 is clearly one of significant improvement.

Coastal Waters

The net length of unsatisfactory class C & D coastal waters was further reduced by 15 km in 2004, giving a total reduction of **187 km** since 1999. Quality in 2003 was undoubtedly helped by the reduced run-off resulting from the dry weather. Despite the wetter weather of summer 2004 this progress was maintained and SEPA is now confident that the overall improvement target for the period 1999 – 2006, a reduction of **145 km** in poor quality waters, will be surpassed.

The major investments made by Scottish Water to improve the treatment of sewage discharges to coastal waters have clearly been of great benefit to water quality. On current classification measures, 135 km of poor quality coastal waters remain, and work to secure the upgrading of these is continuing. The occasional bacterial pollution of some coastal waters (including some bathing waters) due to diffuse pollution following substantial rainfall, will unfortunately continue for at least the next few years.

The Future

Beyond 2006, new EU Water Framework Directive classification measures will be applied to all water categories, and new higher default quality objectives will apply. A preliminary assessment of which Scottish waters may not meet these exacting standards without the intervention of management measures has recently been made and published by SEPA (http://www.sepa.org.uk/wfd/index.htm). Equivalent water characterisation reports are available for all other river basin districts throughout the EU.

1. Introduction: Water Quality Background Notes

Following its establishment in 1996, SEPA introduced a new rivers quality classification scheme, which included most elements and numeric standards already in use in England and Wales, but unlike there, the SEPA scheme (http://www.sepa.org.uk/data/classification/index.htm) results in a single classification class outcome incorporating biological, chemical and aesthetic elements. This provision of a single overall outcome is intended to be readily understood by casual observers, while actual causes of any downgrading can still be investigated and tackled by SEPA. Existing schemes for the classification of coasts and estuaries were maintained. On establishment, SEPA set itself water quality targets to be achieved by 2000.

SEPA has reported on the progress it made in the period 1996 – 2000. During this time, poor quality (classes C&D) rivers were reduced by 361 km and coastal waters by 25 km, but the extent of unsatisfactory estuarine areas increased by 2 km^2. Further new targets were set in 2000, on the basis of 1999 water quality; the aim is for these new targets to be achieved by 2006, and they have been included in SEPA's Corporate Plans.

In conjunction with the new set of targets, an improved digital system for recording river and stream lengths was introduced in 1999/2000. The classification criteria remained unchanged, but are now expressed for a Digitised Rivers Network (DRN), which includes the same river systems as before plus islands' rivers and tidal waters, and which can be displayed using Geographical Information Systems (GIS). This enables river lengths to be automatically measured and river quality information to be more accessible (now available on SEPA's website at http://www.sepa.org.uk/rqc/map.asp). The apparent length of watercourses covered by the DRN is less than that of the earlier network because it does not include thousands of minor, sometimes seasonally dry, and generally remote headwater tributaries which have never been monitored. Also with the DRN, waters which are not directly monitored are described and reported as being unclassified, rather than being assumed to be of good quality, which was the former practice. This revised approach to classification is more precautionary, and considered to be consistent with future requirements.

It is SEPA's intention that the extent of unclassified rivers will be progressively reduced to near zero by the time EU Water Framework Directive (WFD) systems are in place in 2007. This is being done in two ways. The first of these is the further development of an extensive network of ecological quality monitoring sites in rural areas which will normally be only infrequently sampled. However, those new sites which are found to be not of good quality are then investigated. Monitoring of these waters will be continued on an annual basis until the cause of the downgrading is known and remedial action has been shown to be effective. Secondly, the current allocations of river stretches to monitoring sites for quality class assignment are reassessed, and extended where that is appropriate. By these means, for 2004, over 2000 km more of river length was classified for the first time.

While SEPA's work to the present time has been significantly aimed at eliminating the most seriously polluted class C and D waters, it has become clear in the context of the WFD that this Directive's standard target of attaining "good ecological status" will for rivers probably imply a quality target closer to the current class A2/B boundary. In this context it is sobering to note that in 2004, the total length of class B, C and D rivers is over 3,300 km of the 25,400 km total length.

Final assessment in relation to SEPA's 2006 WQ targets will be made early in 2007. Then, from 2007 onwards, entirely new WFD quality classification schemes will be applied to all waters. To enable some comparison of the 2007 WFD status assessments with classifications using the current classification schemes, it is envisaged that the SEPA classification schemes may be applied to a representative subset of the new WFD quality monitoring network sites, as well as applying the future WFD quality status criteria to historic data from a fixed set of representative sites.

In the following sections, results are set out as tables showing the length (in kilometres) of rivers classified by SEPA as Excellent, Good, Fair, Poor or Seriously Polluted (classes A1, A2, B, C and D respectively). For the area (in square kilometres) of estuaries and for the length of coastal waters there are four quality classes; Excellent, Good, Unsatisfactory (fair/poor) and Seriously Polluted (classes A, B, C, D respectively). Examples are given to show where the more significant improvements or deteriorations have occurred and the actions SEPA is taking to address problems.

2. Rivers and Streams

Summary annual classification outcomes for rivers and streams, by SEPA area, are presented in Table 1 below. They indicate that SEPA is well on course to meet its 2006 river quality target. Some of the details for the most significant quality changes are then presented; starting in the North and working clockwise round the country.

Table 1: River classification for the years 1999 to 2004 (DRN)

	Year	Unclass-ified	A1 Excellent	A2 Good	B Fair	C Poor	D Seriously Polluted	Total
Length km	1999	N/A	N/A	N/A	2577.0	1077.7	91.2	25381.8
(%)					(10.1)	(4.2)	(0.4)	(100)
Length km	2000*	12815.6	3171.5	6087.2	2453.2	853.9	73.4	25454.6
(%)		(50.3)	(12.5)	(23.9)	(9.6)	(3.4)	(0.3)	100.0
Length km	2001	11960.1	3874.5	6324.9	2339.1	929.4	82.5	25510.5
(%)		(46.9)	(15.2)	(24.8)	(9.2)	(3.6)	(0.3)	(100)
Length km	2002	7987.9	5279.4	8655.5	2562.7	902.9	56.3	25444.7
(%)		(30.5)	(20.1)	(33)	(9.8)	(3.4)	(0.2)	(100)
Length km	2003	5903.3	6815.2	9540.4	2373.8	750.8	52.6	25436.1
(%)		(23.2)	(26.8)	(37.5)	(9.3)	(3.0)	(0.2)	(100)
Length km	**2004**	**3806.5**	**7659.9**	**10612.5**	**2587.6**	**716.6**	**50.6**	**25433.8**
(%)		**(15)**	**(30.1)**	**(41.7)**	**(10.2)**	**(2.8)**	**(0.2)**	**(100)**

Actual length of Classes C and D in 1999	**1169 km**
Actual length of Classes C and D in 2004	**767 km**
Target length of Classes C and D by end 2006	**818 km**
Actual change in length of Classes C and D 1999 to 2004	**- 402km (-34%)**
Target change in length of Classes C and D 1999 to 2006	**-351km (-30%)**

* Figures for 2000 are slightly amended from those previously reported due to inclusion of a toxic substances classification previously accidentally omitted in one area.

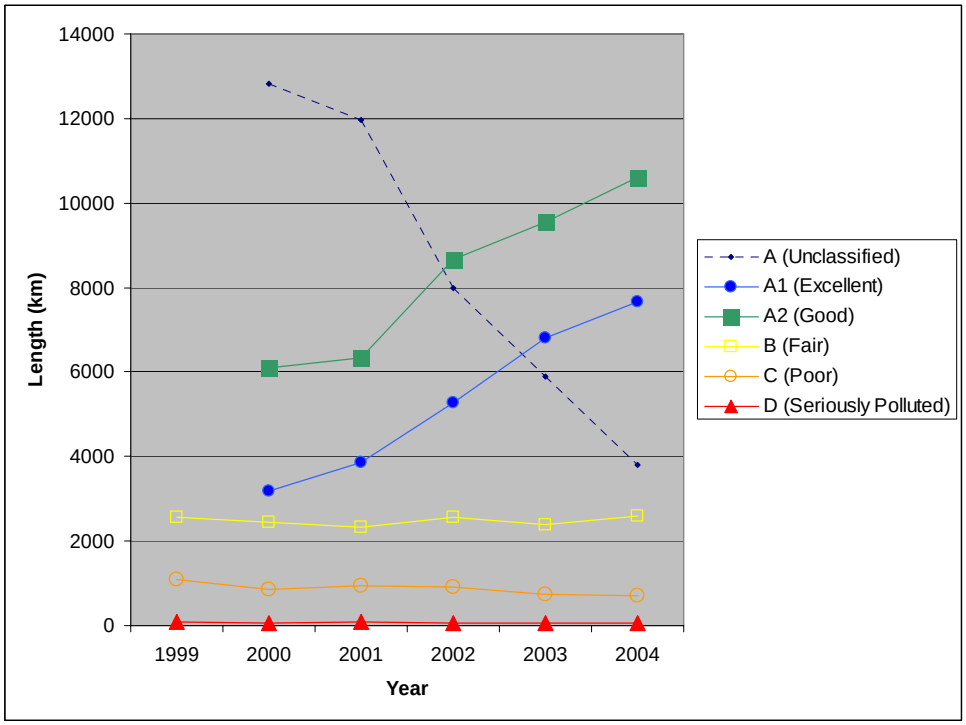

Figure 1: river lengths (km) 1999-2004

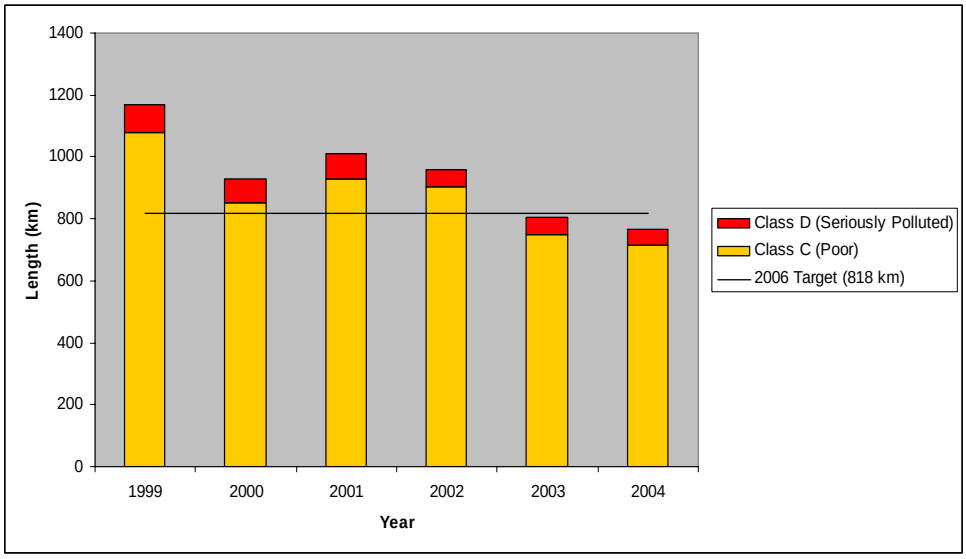

Figure 2: class C and D river lengths (km) by year and 2006 target

Throughout Scotland, the length of rivers classified has been extended by addition of many new biology monitoring sites which will be monitored on a once in three year basis unless problems requiring investigation are found. The total length of fair (class B) river waters increased between 2003 and 2004. Some of this increase was improvements from rivers previously classified as poor or seriously polluted. However, most of the increase in class B results from rivers that had been classified as excellent or good in 2003. It is important to remember that 2004 was a particularly wet year, for example June was the wettest on record for parts of the east coast and August rainfall was more than double the average for this month over large areas of Scotland. Similarly, many river flows were classified as either notably or exceptionally high. Against this background, it is pleasing to note that the newly monitored waters were generally found to be of either excellent (A1) or good (A2) quality, resulting in substantial increases in the length of class A1 and A2 waters. It is both a SEPA objective and an EU Water Framework Directive requirement to prevent the deterioration of high and good quality waters.

Freshwater Improvements

In the Thurso team area 3.2 km of the Gillock Burn in Caithness (which had deteriorated in 2003), has improved from class C to class B. This follows an Environmental Improvement Plan (EIP) in 2003/2004, when Scottish Water installed a reed bed to provide additional treatment for the effluent from Gillock septic tank.

In the Fraserburgh area 1.3 km of a tributary of the Blackwater Burn improved from class C to B although poor flow characteristics in the watercourse mean that continued upgrade can not be guaranteed.

North of Aberdeen 1.1km of the Blackdog Burn improved from class C to B following capping of the Tarbothill landfill and consequent reduction of leachate infiltration.

On the Elrick Burn, west of Aberdeen, 2.7 km has improved from class D to class C. Further downstream in the same catchment, 4.5 km of the Brodiach Burn has improved from class B to class A2. The Elrick Burn is one of the watercourses targeted for improvement as part of the '3 Dee Vision' project (see SEPA website http://www.sepa.org.uk/publications/sepaview/index.htm). New wetlands are being installed to intercept surface water sewer discharges from nearby houses and industrial estates. As the project progresses, it is hoped that further improvements will be achieved.

A 2.5 km stretch of the Brothock Water in Arbroath improved from class C to B. The ecology of the river had improved following the completion of dredging work as part of a flood prevention scheme.

In the River Tay catchment near Perth, two stretches improved from class C to class B due to reduction in toxic ammonia concentrations in two effluents. Additional reed bed treatment of the effluent from Methven Waste Water Treatment Works (WWTW) resulted in the improvement of a 1.8 km stretch of the East Pow at Moss-side. Although not yet working perfectly, the installation of a new membrane treatment plant at Wolfhill WWTW has resulted in the partial upgrading of a 4.6 km section of the Burrelton Burn downstream of Wolfhill.

In Falkirk, the Logie Water has at last improved in quality from class C to class B. This stretch was previously affected by a paper mill, but the mill has now been closed for three years.

The Breich Water at Cuthill Bridge in the River Almond catchment in West Lothian has benefited from a Coal Authority improvement scheme at Cuthill, which was completed in December 2003. A source of polluted minewater is now intercepted and pumped to a treatment system prior to discharge. As a result a 5.1 km stretch achieved a significant reduction in iron levels, leading to improvement from class C to B. In the same catchment, the closure of the Scotmalt plant in West Lothian has led to the improvement in water chemistry in a 2.2 km stretch of the River Almond at Boathouse Bridge, leading to a classification improvement from C to B.

In the Borders area, the condition of the Lambden Burn and Spittal Burn was probably helped by increased flows and hence effluent dilution due to the relatively wet weather in 2004. The Spittal Burn is the subject of an Environment Improvement Plan. The WWTW serving the village of Skirling which discharges to the Spittal Burn, has been proposed for a Scottish Water investment scheme to improve treatment.

Numerous significant water quality improvements were recorded in the west of Scotland. The Mein Water in Annandale, Dumfries lies within an intensively farmed catchment and suffers from episodic diffuse agricultural pollution. Farms in the catchment are regularly inspected or visited and problems have been addressed. Following this work, episodic organic pollution inputs following heavy rainfall have reduced, leading to water quality upgrading. Sections of the Piltanton Water catchment in Galloway have improved from class C to B. All point source discharges, as the primary cause of pollution, have been inspected with actions agreed. The impacts from diffuse runoff arising from the extensive agricultural land area coupled with topography still require consideration. The main pressure in this catchment arises from livestock having direct access to watercourses. SEPA has been liaising with farmers in the area and promoting good practice, which has resulted in a noticeable improvement in water quality.

In both the Pow and Rumbling Burn catchments in Ayrshire, stream biology has greatly improved compared with 2003, and almost 8.5 km have improved in quality from class C to B. The upper reaches of the Pow Burn improved because of enhanced sewage treatment at Hansel Village. However, both catchments are adversely affected by diffuse farm run-off in their upper catchments. Farm inspections and subsequent remedial actions undertaken in recent years are having a positive effect, but a first time rural sewerage scheme is also required. The lower reaches of the Pow Burn are culverted under Prestwick International Airport and the A79 and are polluted by surface water drainage.

Water quality in the lower reaches of the Black Cart Water improved considerably at the end of 2004. Under Scottish Water's Quality and Standards II (Q&S2) investment programme (2002/03-2005/06), both Johnstone WWTW and Linwood WWTW closed in December 2004 with both effluents now diverted to the Clyde estuary via the new Erskine WWTW. Downstream chemical water quality has shown immediate improvement. Improved biology and an upgrade in overall class is anticipated for 2005.

A substantial length of the Tollcross Burn in Glasgow was upgraded from class C to B in 2004. The area is still affected by unsatisfactory storm sewer overflows and urban run-off, which results in occasional oxygen demand and ammonia spikes, but their impact has at least temporarily lessened. SEPA has previously identified a backflow problem at Springhill Sewage Pumping Station, and a Q&S2 project has now begun to prevent this occurring in future by installing a backflow protection mechanism. This should deliver further environmental improvement over the next year.

The Espedair Burn joins the White Cart Water at Paisley. The burn is generally of fair quality, but throughout its length is subject to combined sewer overflow (CSO) discharges which affect water quality. The watercourse had been downgraded in 2003 on aesthetics due to gross litter on the riverbank and in the water. The litter consisted mainly of motor vehicle parts and general non-sewage debris. In 2004, the local authority cleared the river and SEPA officers have noted a significant improvement.

During late 2000 and most of 2001, many sections of the Forth and Clyde Canal were subject to engineering works as part of the Millennium Link project. During 2001, dredging and bank re-enforcement took place and in some places most of the water was removed from the canal. As a result, dissolved oxygen had been recorded as low as 40% saturation. The project was completed by 2003 and has succeeded in allowing craft to sail the extent of the canal from Grangemouth in the east to Bowling in the west. Over 6 km of canal water in the west has upgraded in subsequent years.

Like many of the East Kilbride watercourses, the Kittoch Water continues to suffer from sewage pollution as a result of cross connecting sewerage/surface water drains. With pressure from SEPA, Scottish Water have been working to reduce these problems, and it is encouraging that in 2004 stream biology scores were considerably improved, leading to partial upgrading to class B.

In the North Calder Water catchment, 9km has upgraded from class C to B due to improved biology, although occasional organic pollution and sewage debris are still evident. The river passes through some industrial estates that have known problematic surface water outfalls.

A total length of 18.7 km of watercourses within the River Kelvin catchment was upgraded from lower water quality classes last year. A further 2.5 km of Luggie Water has now improved from C to B with the best invertebrate biology scores ever recorded on this river following the closure of Cumbernauld's Deerdykes WWTW in January 2002. The ecological quality of the Bothlin Burn is expected to improve in 2005 as a result of the closure of Auchengeich WWTW in March 2003.

In Fort William, 0.4 km of an un-named burn receiving surface water discharges from Kilmallie Sawmill has improved from class C to class B. This watercourse was the subject of an Environmental Improvement Plan (EIP) in 2003/2004, which resulted in improvements to the treatment of surface water before discharge from the site, and changes to site working practices to minimise contamination of surface water in the first place. Following completion of the EIP, there do appear to be sustained reductions in levels of organic pollution and improvements in dissolved oxygen (DO) concentrations.

<u>Poor Quality Freshwaters, and Downgrades</u>

Not all recorded water quality changes were positive. Numerous streams of borderline quality inevitably fluctuate between adjacent classes, and other changes are due to specific pollution events.

6 km of the Burn of Bouster on Yell, Shetland were downgraded from class B to C because of low dissolved oxygen levels. There is an improvement in the data since February 2004 and further samples will show if the upward trend has been maintained.

On the Clachan Burn (near Bettyhill in Sutherland), 3.5 km were downgraded from class A2 to class C. This is an aesthetics downgrade, arising from rubbish being dumped into the burn from the A836 road bridge. In reality, the affected length is significantly less than the total stretch length of 3.5 km.

The Frenich Burn in Perthshire continues to suffer from heavy metal discharges from Foss Barytes mine. In 2004, all of the zinc results for the year were greater than the Environmental Quality Standard, resulting in a 4.9 km downgrade to class C.

In West Lothian the specific reason for the downgrade in biology at Dolphington Burn is not known, although its normal quality range varies between classes B and C. Removal of a small WWTW upstream of the affected stretch is currently proposed under Q&S3. Downgrades to the River Almond at Kirkliston are likely to have been caused by increased storm overflows during wet weather.

The tributaries of the Foulshield Burn and the Bickerton Burn were downgraded due to ferruginous mine resurgence, with the latter watercourse also affected by ammonia. There was significant historic mine working in this area, which has left iron-rich spoil. Point sources of polluting groundwater were identified by the Coal Authority, but there is the possibility of diffuse seepages throughout the catchment. Ammonia can arise as a natural source from mine workings and this is considered likely to be the case here as other sources have been eliminated.

In the Edinburgh and Lothians area, a 2.6 km stretch of the East Peffer Burn downstream of Athelstaneford WWTW has tended to be a borderline class B/C watercourse. As it was a particularly wet year it is possible that there were more overflows, although the sand filter is known to perform well. However, the upstream 4.5 km stretch was also biologically poor so it is probable that at least part of the problems originated further upstream.

The Brunstane Burn was again borderline between B and C classes, and is subject to urban drainage. Likewise the May Burn suffers surface water drainage from industrial and commercial premises.

The reason for the downgrade in Eccles Burn at Puncheon Bridge is uncertain, but flow is very low during summer months, and Eccles WWTW discharges to this watercourse upstream of the sampling point. The discharge is compliant with its current consent conditions, but due to the very small size of the receiving burn, a Scottish Water Q&S3 (2006/07–2013/14) capital investment scheme to relocate the discharge has been proposed.

The downgrade of the Biggar Water at Broadford Crossing is believed to be due to a pesticide impact from the upper catchment, which the local team have been having great difficulty in pinning down. In addition the river was re-

sectioned upstream before the autumn 2003 sample was taken and is still recovering. There are ongoing problems with this stream, which are the subject of SEPA Environmental Improvement Plans.

The 7.7 km downgrade (from class A2 to C) of the Manse Burn 300m below Westruther is almost certainly due to intensive livestock in the catchment upstream of this site, which will have been exacerbated by the wet year with increased run-off.

The Black Grain Burn is a tributary of the Lochar Water and is located to the south east of Dumfries. It has some livestock farming in the upper parts, but the catchment is dominated by forestry. A catchment study undertaken in 2002/03 indicated that this waterbody is a borderline class B/C due to naturally occurring low DO waters which drain from the afforested moss land. The downgrading of a short stretch from B to C in 2004 is linked to an elevated oxygen demand and later low dissolved oxygen levels. The high oxygen demand was traced to a silage effluent problem.

Almost 12 km of the Abbey Burn near Dundrennan, Galloway, dropped from good quality to poor. The downgrade was due to a farm silage effluent problem. New fencing had punctured a perimeter drain allowing the effluent to enter a ditch rather than going to the effluent tank. SEPA staff contacted the farmer and the situation was remedied immediately. This was a one-off incident and the watercourse should soon recover.

Three high ammonia results in March, May and June 2004 downgraded a small stretch of the Water of Fail in Ayrshire. The high ammonia levels affecting the watercourse are thought to have originated from Tarbolton Moss landfill site. SEPA have carried out a detailed survey to ascertain if this is correct.

Almost 2 km of the Kilmarnock Water were downgraded for 2004, due to poor aesthetics. This section of water has been straightened and has walled embankments to alleviate flooding. This means water levels can fluctuate rapidly. High water levels deposit sewage debris on tree branches following rainfall, causing an aesthetic problem. Surface water drains and CSOs will be the focus of investment under Scottish Water's Q&S2 and Q&S3 capital investment programmes. Scottish Water will also fit required new screens to a number of discharges in the area, which should alleviate many of the problems.

In the River Earn catchment, North Ayrshire, iron levels have exceeded 2mg/l regularly since summer 2003. This small watercourse has been affected by surface water run off from M77 roadworks. SEPA has worked with the contractors to minimise pollution, but has also reported a number of pollution incidents to the Procurator Fiscal (PF). Now that the problem has been highlighted and the roadworks are due for completion May 2005, SEPA expects this stretch of watercourse to return to good quality.

4 km of the Annick Water downstream of Stewarton WWTW were downgraded from class B to class C. Both spring and autumn ecology sampling scores were low and contained high abundance of organic pollution tolerant families.

The Levern Water suffered from high ammonia inputs in February and September 2004. Scottish Water is looking to upgrade Neilston WWTW in the very near future to achieve a 5mg/l ammoniacal nitrogen standard. This upgrade is a Q&S2 requirement to comply with the Freshwater Fisheries

Directive (78/659/EEC). This should hopefully resolve the problems of elevated ammonia results downstream at Gateside Road.

A large length of the Auchter Water is badly affected by ferruginous (iron bearing) mine water from abandoned mines in the Wishaw area of Lanarkshire (Kingshill Colliery). This long-standing problem is being addressed as part of a Coal Authority remediation programme, but it will take a long time to redress the issue.

The Mouse Water catchment in the Clyde Valley is also affected by ferruginous (iron bearing) mine water from abandoned mines. The very small iron-rich particles cause a pronounced turbidity in the main river, and in severe cases can coat the riverbed, smothering invertebrates. Iron levels in the catchment currently average >2.0mg/l, which results in SEPA classifying the river as class C (poor). A Mouse Water minewater treatment system was completed by the Coal Authority in November 2004. SEPA has an Environmental Improvement Plan to monitor improvements in Douglas, Dippool, and Mouse waters resulting from anticipated future reduced minewater discharges.

An unfortunate downgrade occurred in the Capelrig/Auldhouse Burn catchment in December 2004. This poor result was directly caused by a Scottish Water contractor carrying out storm tank improvement works at an historic upstream WWTW site. The outlet of the tank in question became blocked during a period of prolonged rain making it extremely difficult for the tank to be drained, (which it eventually was) resulting in a prolonged discharge of untreated effluent to the watercourse.

Both the Shirrel Burn and Kennel Burn in North Calder Water catchment were affected by elevated ammonia levels during 2004. It is thought that problematic CSOs may be to blame for the resulting degradation of both of these streams. However, in the case of the Shirrel Burn, there have been polluting discharges during 2004 from a surface water drain serving Newhouse Industrial Estate and these would undoubtedly have caused problems in the receiving waterbody. Rainfall records show there was only moderate rainfall in the catchment around the times of sampling.

The River Kelvin received a high ammonia input in May 2004. SEPA investigated and found an unsatisfactory discharge from Summerston landfill site. Frequent unauthorised discharges of leachate from various surface water outfalls had the effect of elevating the ammoniacal nitrogen concentration in the river. Following SEPA pressure, recent improvements in site practices have meant that remaining surface outfall discharges have been almost free of leachate. However, there are still problems with the leachate management plant. SEPA staff are now reviewing the consent conditions imposed on this plant, in order to prevent further pollution of surface and ground waters.

A small stretch of the Badden Burn in Argyll was adversely affected by flood-prevention engineering work. Dissolved oxygen levels in the river were recorded as 17.5% saturation on 17th July and 6% saturation on 23rd November (average is > 60%sat). Suspended solids reached a peak of 1,094 mg/l. Sampling officers noted engineering work to protect the road from flooding had caused heavy sedimentation in the watercourse. The work has now been completed and the watercourse has recovered.

SEPA will continue to investigate all significant instances of deterioration in water quality. Once the cause(s) is established, then appropriate regulatory,

monitoring or 'environmental improvement plan' actions will be taken with a view to delivering recovery. SEPA has developed strong partnerships with a number of stakeholders and external organisations to raise awareness of water quality issues. The help of others is often required to devise or implement solutions to improve the water quality for specific stretches where the work required is non-regulatory.

3. Estuarine Water Quality

Overall estuarine water quality data for 1999 – 2004 is shown in table 2 below. The outcome in 2004 was more favourable than last year with wetter weather resulting in higher river inflows to the major estuaries and consequent higher dilution and greater mixing. Warning was given with the 2002 results that they were exceptionally good due to the wet weather that year. It is because of these clearly weather induced changes that a three year average figure is now included, as this gives a clearer picture of the overall trend of gradual improvement. The sediments of Scotland's major industrialised estuaries will continue to carry a burden of organic matter and some toxic contaminants from historic discharges for many years to come.

Table 2: Estuarine water quality classification for the years 1999 to 2004

	Year	A Excellent	B Good	C Unsatis.	D Seriously Polluted	Total
Area **km²**	1999	633.3	143.6	31.6	0.9	809.4
(%)		(78.2)	(17.7)	(3.9)	(0.1)	(100)
Area **km²**	2000	637.0	132.9	38.2	1.2	809.3
(%)		(78.7)	(16.4)	(4.7)	(0.1)	(100)
Area **km²**	2001	668.6	116.5	23.3	1.1	809.5
(%)		(82.6)	(14.4)	(2.9)	(0.1)	(100)
Area **km²**	2002	653.2	140.7	14.6	0.8	809.4
(%)		(80.7)	(17.4)	(1.8)	(0.09)	(100)
Area km²	2003	658.6	122.9	27.0	0.9	809.4
(%)		(81.4)	(15.2)	(3.3)	(0.1)	(100)
Area km²	**2004**	**696.1**	**92.3**	**20.9**	**0.2**	**809.5**
(%)		**(86)**	**(11.4)**	**(2.6)**	**(0.02)**	**(100)**

Actual area of classes C and D in 1999	**32.5 km²**
Actual area of Classes C and D in 2004	**21.1 km²**
Target area of Classes C and D by end 2006	**26 km²**
Actual change in area of Classes C and D 1999 to 2004	**-11.4 km² (-35%)**
Target change in area of Classes C and D 1999 to 2006	**-6.5 km² (-20%)**

If estuary class C and D totals are presented as a three-year rolling average total, to smooth over the effect of single wet or dry years, the overall improvement trend is clearer:

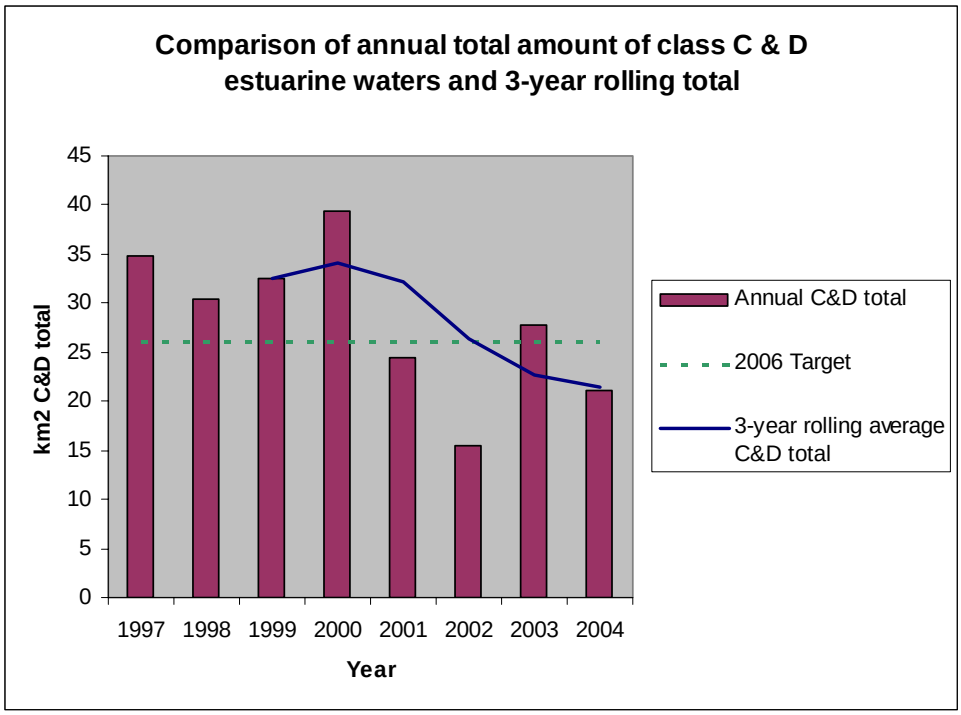

Figure 3: Three-year rolling estuarine class.

Improvements

In the north of Scotland, the area of unsatisfactory estuarine water reduced for the first time since 2000. In Aberdeen Harbour, 0.36 km^2 improved from class C to class B. This was due to improved aesthetics in relation to discharges from the city centre sewer overflows and oil pollution from vessels using the harbour. Now, only 0.16 km^2 around the inner harbour and Commercial Quay remain in class C. Further improvements are expected to accrue from SEPA's ongoing Aberdeen Harbour Environmental Improvement Plan (EIP).

At Lossiemouth, 0.51 km^2 of the Lossie Estuary improved from class B to class A, following completion of the new waste water treatment works (WWTW) at Oakenhead Wood. All of the Lossie Estuary is now class A.

At Cromarty, 2 km^2 of the Cromarty Firth improved from class B to class A following replacement of several untreated sewage outfalls with a single discharge from the new WWTW.

In the Esk estuary (which includes the Montrose Basin) 0.9 km^2 has been upgraded from good to excellent. The new secondary treatment plant and screened CSOs at Montrose are now operational and the previous discharges of unscreened sewage have ceased to the South Esk estuary. This resulted in the narrow neck (1 km^2) of the South Esk being upgraded to class A in 2002.

Environmental monitoring showed no impact from the discharge of chemical effluent to the South Esk from the Glaxo factory. The effluent is well treated and discharged on the ebb tide to prevent entrainment into the Montrose Basin. It is rapidly dispersed by strong tidal currents in the estuary.

In the Tay estuary, 15.2 km^2 has been upgraded from class B to class A between Dundee and Newport-on-Tay. This reflects ongoing improvements in water quality following the commissioning of the Tay Wastewater Scheme. There is a possibility that the remaining area of Class B on the south shore could be upgraded to class A. This will have to await a new WWTW providing secondary treatment at Tayport and Newport-on-Tay. This new works has to be in place by December 2005 to comply with the timetable of the EU Urban Waste Water Treatment Directive, and is one of the remaining scheduled Scottish Water Q&S2 investments.

The Forth, Tyne and Eden estuaries all retained the same classifications as in 2003.

Improvements in aesthetic conditions in the Clyde estuary have been recorded in Glasgow city centre from the use of the '"Water Witch" debris removal vessel by Glasgow City Council and in the Garvel area. The boat has removed 300 tonnes of rubbish and debris from the Clyde in the past year. The amount of debris collected filled 259 skips and the operation has been so successful that consideration is being given to extending it to the rivers Cart and Kelvin. The clean-up has had such an impact on the Clyde that wildlife is returning to the river. This work has resulted in upgrades of 0.6 km^2 from class D to class C and 0.08 km^2 from class C to B. Further improvements are anticipated early in 2005 when fine screens are installed at Shieldhall WWTW and other works are improved. Water quality in the Clyde Estuary was generally good in 2004 with high oxygen concentrations being recorded throughout the system in response to high flows. This resulted in upgrades to 28.26 km^2 of waters.

As with the Clyde estuary, improvements in aesthetics were recorded at Gareloch head foreshore and also at Rhu narrows resulting in upgrade of 0.6 km^2 from C to B. In contrast however, summer deep water oxygen depletion of the Gareloch resulted in 9.8 km^2 being downgraded from class A to B.

There were improvements in the aesthetic condition of the Ayr Estuary due to the removal of combined sewer overflows (CSO).

In Galloway, improvements to sewage treatment have resulted in water quality and aesthetic improvements. Consequently there are upgrades from class C to A of 0.08 km^2 in the Rough Firth and 0.1 km^2 in the Cree Estuary and an area of 0.2 km^2 is upgraded from class B to A.

Poor Quality Waters, and Deteriorations

On the east coast, the Montrose Basin remained class A although there are concerns that the extensive coverage of the Basin by opportunistic green algae may result in downgrading under the Water Framework Directive. The physical characteristics of the basin make it susceptible to algal growth. The River Esk is the main source of nitrate to the Basin, but concentrations in the river may be expected to decrease following designation of the catchment as a Nitrate Vulnerable Zone.

The expected biodiversity along Montrose Beach front and at the mouth of the estuary was significantly reduced. Additional sand was added to build up the beach level in 2002, with the result of downgrading 0.1 km^2 to class B. The last Montrose Beach/South Esk estuary survey in September 2003 reported a slight recovery of the intertidal fauna. SEPA waits to see evidence of further recovery

and stabilisation of the fauna before upgrading to class A. As a result, 0.1 km^2 of the South Esk was downgraded to class B in 2004.

Further south on the East coast, all of the unsatisfactory 11.7 km^2 of class C estuarine area is within the Forth Estuary. Most of this estuary is Class B, but some intertidal areas are downgraded to class C as a result of historic discharges. There is also an area of class C in the upper estuary resulting from low dissolved oxygen concentrations during the summer months.
The Forth Estuary is not expected to achieve class A because of its inherently turbid nature and the large number of industrial and domestic waste discharges it receives. However, there are areas where improvements may be achieved. These are:
(i). The upper estuary, where there is evidence that the dissolved oxygen status is improving as a result of the decrease in discharges of organic waste. Future nitrification at Stirling WWTW is also expected to improve dissolved oxygen concentrations.
(ii) 6 km^2 of mudflat around Grangemouth remains at class C. Recent evidence suggests that the rate of improvement of the biology has slowed, and one-year changes are now within the range of natural variability.
(iii) The closure of Caldwells Paper Mill may lead to improvements in the future, but Inverkeithing Bay remains in class C at present.

In the west, the Cart Estuary remains heavily impacted from benthic disturbance, aesthetic problems from Paisley WWTW and CSO discharges. An oil spill in 2004 further stressed the White Cart Estuary resulting in Classes C and D persisting.

4. Coastal Water Quality

As shown in Table 3 below, the headline length of unsatisfactory coastal water has been more than halved since 1999. This substantial improvement is primarily due to the big improvements in treatment of sewage discharges delivered and being delivered by the Scottish Water capital investment programmes Q&S1 and Q&S2. Further quality improvements arising from these programmes will be delivered and the overall improvement target for 2006 will be surpassed. The only adverse change in 2004 was an increase in unsatisfactory coastal waters in south west Scotland. This was due to diffuse pollution impacts on bathing waters following periods of heavy summer rainfall. More details are given in SEPA's Bathing Waters Monitoring Report (http://www.sepa.org.uk/publications/bathingwaters/index.htm). SEPA is working both directly and through others involved with farms and farming communities, and is seeing reductions in diffuse run-off from some rural sources into coastal bathing waters.

Table 3: Scottish Coastal waters classification for the years 1999 to 2004

	Year	A Excellent	B Good	C Unsatis.	D Seriously Polluted	Total
Length km	1999*	10906.4	569.4	271.3	50.3	11797
(%)		(92.4)	(4.8)	(2.3)	(0.4)	(100)
Length km	2000*	10979.8	556.3	224.7	37.1	11798
(%)		(93.1)	(4.7)	(1.9)	(0.3)	(100)
Length km	2001	10995.9	559.7	217.5	24.8	11798
(%)		(93.2)	(4.8)	(1.8)	(0.2)	(100)
Length km	2002	11032.4	549.6	191.6	22.9	11796
(%)		(93.5)	(4.7)	(1.6)	(0.2)	(100)
Length km	2003	11080	566.5	127.7	22.3	11796
(%)		(94.0)	(4.8)	(1.1)	(0.2)	(100)
Length km	**2004**	**11091.1**	**568.3**	**123.6**	**11.6**	**11794.6**
(%)		**(94.0)**	**(4.8)**	**(1.0)**	**(0.1)**	**(100)**

Actual length of Classes C and D in 1999	**322 km**
Actual length of Classes C and D in 2004	**135 km**
Target length of Classes C and D by end 2006	**176 km**
Actual change in length of Classes C and D 1999 to 2004	**-187 km (-58%)**
Target change in length of Classes C and D 1999 to 2006	**-145 km (-45%)**

1999 figures have been corrected relative to some earlier SEPA publications to take account of data for some islands which was unavailable at that time.
* Relative to previous annual reports, length of class A reduced by 4.8 km, and class B by 1.5 km to eliminate double counting of Tyne estuary.

Presenting coastal waters quality trends as a three-year rolling average total smoothes out the obvious influence of particularly wet or dry years as shown below:

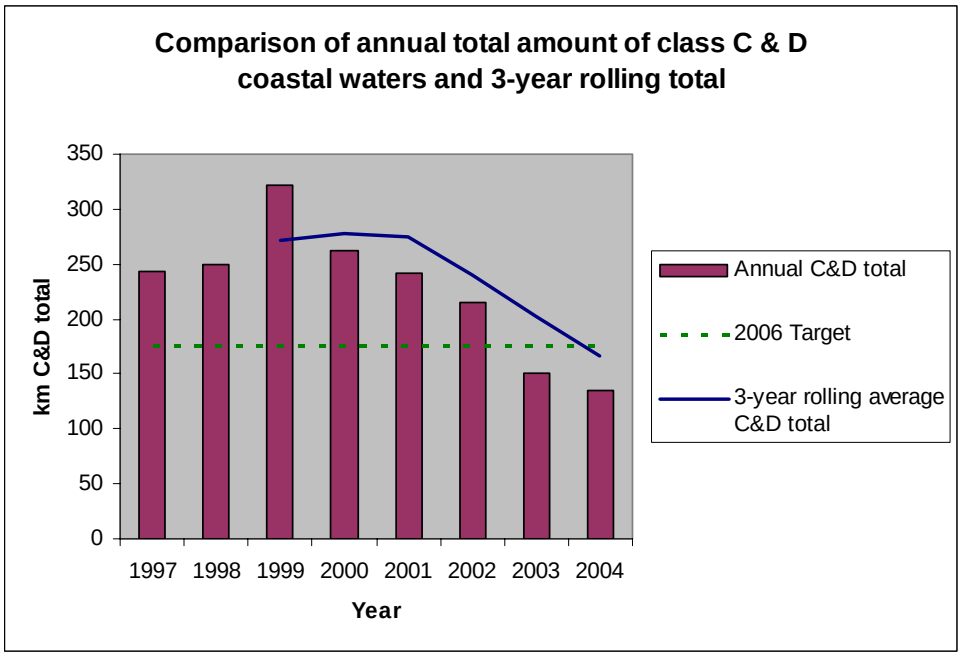

Figure 4: Three-year rolling coastal quality classification.

Improvements

In Shetland, 4 km of coastline around the Sullom Voe Oil Terminal upgraded from class C to class B. This improvement is attributed to the phasing out of TBT as an anti-foulant on the hulls of larger vessels. TBT (tributyl tin) is one of many 'endocrine disrupting chemicals' ("gender benders"), and recent monitoring has indicated a welcome reduction in environmental concentrations in the voe.

At Dunnet Bay near Thurso, 1.5 km of the coastline improved from class C to class B. This follows a community initiative to remove large quantities of plastic, fishing gear and driftwood from the beach.

There were numerous water quality improvements in the north of Scotland accruing from considerable investment in new sewerage schemes.

At Buckie, 4.3 km significantly improved from class D to class B. This follows diversion of fish and shellfish processor discharges to the regular sewage network, and confirmation of improvements arising from the completion of the new waste water treatment works (WWTW) at March Road, Buckie. Along the coastline on either side of Buckie, 2.9 km have been upgraded from class C to class B. These improvements are also attributed to the new WWTW.

In Banff and Macduff, 4.1 km improved from class C to class B, following completion of the new WWTW at Berrymuir Quarry.

At Sandhaven, 1.4 km improved from class C to B, following completion of the new WWTW at Phingask, just to the west of Fraserburgh.

In Fraserburgh itself, 3.2 km significantly improved from class D to class B. Gross sewage contamination from several outfalls has been greatly reduced as a result of improvements to the sewer network serving the new Phingask WWTW.

There have been significant improvements to the harbour area in Peterhead (1 km from class D to class B, and 0.8 km from class C to class B). These improvements are due to a number of factors: a new WWTW at Burnhaven and associated improvements to the sewage network. There have been no complaints or observations of oil pollution within the general harbour area, and more specifically, a welcome dearth of reports or complaints of oil pollution from the south bay oil marine base.

At Cruden Bay Harbour, 1 km improved from class C to class B. This follows removal of an untreated sewage outfall and diversion of sewage to the Burnhaven WWTW.

St. Andrews East Sands was upgraded to class A as a result of improvements to sewage treatment. All sewage from St. Andrews is now pumped to a new WWTW at Kinkell Ness where it undergoes tertiary treatment and disinfection. East Sands attained guideline standard for the second year since the new WWTW was commissioned.

A coastal water stretch at Buckhaven in Fife was upgraded to class B in 2004 due to the continued improvements following the removal of a sewage discharge containing trade effluent. This effluent has been pumped to the Levenmouth WWTW since 2001. A new outfall to coastal waters was constructed in this area, at this time, to dispose of the effluent from a distillery. The effluent is discharged 800m from the shore into 15m of water. Environmental monitoring of the waters and an underwater video survey of the seabed in the vicinity of the distillery outfall discharge have shown no adverse impacts, thus confirming the good, class B, status of this coastline.

The short stretch of class C at Kinghorn Harbour in 2003 was upgraded to class B in 2004. This is a result of improving water quality following the transfer of treated sewage to the long sea outfall at Pettycur.

In March 2004, Scottish Water completed a programme of work to collect the effluent from several untreated outfalls in the St. Abbs area. These are now directed to the WWTW at Eyemouth where they receive full treatment. These improvements have resulted in the upgrading of St. Abbs bathing water from class B to class A.

In the west, continued monitoring of Loch Ryan for TBT impacts (imposex) showed improvements to the coastline with 4.2 km now in class B on the east shore north and south of Cairnryan, with only 1.85 km in class C and 2 km in class B on the west shore.

The data from biological monitoring in Ayrshire became available last year and allowed upgrades at Dipple in response to the cessation of the discharge or organic waste to the inter-tidal area. Recovery from organic impacts there has been slow, but in 2004 only 0.5 km remained in class D and 0.1km in class C. At Grangestone, new benthic data showed only 0.1 in class D and upgrades over a further 0.9 km.

Despite the generally poor bacterial water quality recorded along the Ayrshire coast, due predominantly to the wet weather in June and August, an upgrade of 2 km from class D to C was achieved at Ayr North, and 0.3 km from class C to B at Dunure.

In Argyll, there were several upgrades on Islay and Jura, representing the culmination of many years work with the distilleries. A total of 3.4 km have been upgraded to class A in 2004 at Craighouse, Bruaichladdich, Bowmore and Caol Ila. However, the discharge at Laphroaig still gives some cause for concern.

Poor Quality Waters, and Deteriorations

Peterhead Lido designated bathing water had 0.3 km downgraded from class A to class B. In 2004, this bathing water only achieved a mandatory pass, where as in 2003 it achieved the more stringent guideline pass.

In the Firth of Forth, unsatisfactory discharges at Lower Largo and St. Cyrus should be dealt with by Scottish Water under Q&S2 leading to upgrades in these areas. Improvements to unsatisfactory CSOs are required to reduce bacteriological contamination at Pathhead Sands in Kirkcaldy.

North Berwick Bay was downgraded from class A to B as bathing water compliance decreased to mandatory standards in 2004 after attaining guideline standard for the previous three years (2001 to 2003). This reduction in water quality was traced to leakage from a water main. This is thought to have flushed contaminated soils into North Berwick Bay. Remedial action has been taken by Scottish Water, which will hopefully prevent this from happening again.

Bacteriological quality at Whitesands Bay in East Lothian also decreased to EU mandatory standards in 2004 after achieving the more stringent guideline quality standards every year since 1988. This automatically gave it a downgrade to class B. The bacteriological contamination was traced back to the sewage treatment plant at Lafarge cement works and remedial action is planned.

Moving round to the west coast, and in 2004 the amount of class C coastline unfortunately increased by over 14 km resulting mostly from poor microbiological results in many previously class B waters.

In Ayrshire, a decline in microbiological quality was recorded at many recreational stretches, in 2004. The availability of increased monitoring data from Lamlash, Corrie, Lochranza, Blackwaterfoot, Brodick and Pirnmill resulted in 10.5 km being downgraded from B to C on the Isle of Arran. At Croy and Ayr South, Doonfoot and Irvine, a further 5.7 km were downgraded from class B to C. In 2004, there were mandatory failures of the EC Bathing Waters Directive at Carrick, Ettrick Bay on Bute, Irvine and Southerness beaches. The most significant failure in 2004 was at Carrick, which had previously achieved a guideline pass in 2003.

On the Kintyre Peninsula near Campbeltown, a 0.1 km length of class D was instated due to persistent overflowing of CSO due to infiltration problems, which has resulted in aesthetics issues and many complaints from the public.

In Loch Etive, a downgrade of 0.4 km to class B, was recorded due to benthic impacts at Inverawe fish farm, Achnacloich, Taynuilt and Loch Spelve where mussels were found to contain low levels of gHCH (Hexachlorocyclohexane, also known as Lindane). Persistent substances in Loch Goil and Loch Long resulted in 0.3 km of class B. These latter are thought to be derived from waters of the Clyde estuary.

At Broad Bay, near Stornoway on the Isle of Lewis, 0.3 km was newly downgraded from class A to class C. This was due to sewage debris arising from the Vatisker septic tank.

5. Conclusions

2004 saw further improvements in water quality across Scotland. Looking beyond the one-year changes and classification fluctuations, some of which are affected by uncontrollable factors such as rainfall, good long-term improvement continues to be evident. More new sewerage infrastructure and sewage (and other effluent) treatment schemes are being built or are planned, which will provide further quality benefits. SEPA is also maintaining its programme of Environmental Improvement Plans, many of which are directed at problems arising from more diffuse, currently unregulated sources. These will also produce environmental quality improvements. Other initiatives such as improvements in, and better implementation of, codes of best practice such as the "Prevention of Environmental Pollution from Agricultural Activity" (PEPFAA) code, "Forest and Water Guidelines" and the Scottish Executive's 4-point plan to minimise pollution from livestock are helping to reduce rural impacts. Current EU CAP reform proposals also appear likely to eventually deliver environmental quality improvements. Equally importantly, pollution from new urban area developments is being minimised from their inception by the planning and incorporation of "Sustainable Urban Drainage Schemes" (SUDS), to avoid the problems caused by both combined sewer overflows and contaminated surface water run-off.

It is recognised that much remains to be done to bring the quality of all waters up to desired standards, and this ongoing work is being given fresh impetus by the current implementation of the requirements of the EU Water Framework Directive. This Directive will increasingly influence all water and water habitat improvement programmes. It will also introduce new regulatory regimes, bringing under control many activities which impact on ecological quality, but which have not previously been subject to direct regulation. Scotland's waters remain a valuable resource for fish and wildlife, recreation, the transport of well-treated wastes, abstraction and power generation. SEPA aims to ensure through its policies and actions that the future for the quality of all waters and aquatic environments remains positive, and that current improvement trends are maintained, for the enhancement of all uses and benefit of users.

6. Future Quality Assessments

Future water quality work will be increasingly dominated by continuing implementation of the EU Water Framework Directive (WFD). However, it is intended to maintain the existing water quality assessments as reported here until at least 2006, for reporting in 2007. The rivers results reported here are now all available via SEPA's web-site GIS which includes location search facilities. Reports outlining the first WFD "characterisation" of all relevant Scottish waters are also available on the web-site, backed up by database search facilities. It is inevitable, for various reasons, that the characterisation reports present an apparently less rosy view of the quality of our water environment.

The most significant reason for this less positive view is the wider range of pressures which have to be considered for the purposes of the WFD. The assessments reported in this and previous SEPA water quality reports concentrate dominantly on the effects of discharges and diffuse inputs of potential pollutants. For WFD characterisation, account is also taken of water abstractions, impoundments and engineering works such as river straightening, which may also impact overall ecological quality in ways not measured by the current classification schemes.

Also very significant is the fact that characterisation is a risk assessment, rather than a classification (though the two are closely linked), and that the WFD “good status” quality target is defined by the Directive as being well up the quality spectrum. It is appropriate that a slightly precautionary estimate of this quality target has been taken at the characterisation stage, particularly in respect of the currently unregulated and less well understood hydrological and engineering pressures.

Finally, characterisation assessment by water bodies, rather than by the stretches currently classified has some effect. The current stretches are sometimes quite short (perhaps between a discharge point, and confluence with a cleaner or larger stream), whereas the WFD water bodies are mostly larger, and take the overall quality of the poorest stretch within them. This implies that a 3 km poor stretch could result in the whole of a 10 km water body being regarded as “at risk” of failing to meet WFD quality standards. This effect is probably most significant for coastal waters, where an unsatisfactory EU identified bathing water may be only a small part of a relatively large coastal water body, but causes it all to be regarded as “at risk”.

End.
April ’05.