Scottish Environment Protection Agency

NATIONAL WATER QUALITY CLASSIFICATION 2003

Summary

This report summarises the results of SEPA's monitoring of water quality in Scotland's rivers, estuaries and coastal waters in 2003. 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 2003 demonstrate continuing substantial quality improvements in rivers and coastal waters, with some expected short-term downgrading of estuarine waters due to particular weather conditions.

SEPA has set itself targets for reducing the length or area of the poorer quality class C and D waters. The 2003 results show good progress towards achieving these targets:

Rivers

The net length of poor quality class C & D rivers was reduced by 155 km in 2003, giving a total reduction of 366 km since 1999. Part of the 2003 improvement is ascribed to unusually dry weather, but if it can be maintained, then rivers will meet their improvement target for the period 1999 – 2006, which is a 351 km reduction.

Since 1999 there has been very positive progress in improving river water quality. On an averaged basis the annual upgrading target was comfortably exceeded in 2003. A detailed study of the underlying reasons for improvement is still underway, but while some are clearly due to SEPA actions and Scottish Water investments, it is possible that some of the improvement may be due to the dry weather of 2003. This dry weather resulted in reduced volumes of potentially polluting run-off to rivers from both urban and rural sources. However, there have been further significant improvements in 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 increased by 12.5 sq km in 2003, leaving a total reduction of 4.6 sq km since 1999. These waters are therefore still on course to meet improvement target for the period 1999 – 2006, which is to achieve a 6.5 sq km reduction. The 2002 improvement was assisted by the wet summer of that year, and as expected the dry weather of 2003 partly reversed this trend.

Despite overall improved discharge quality, and some local improvements, the dry summer of 2003, which reduced the rate of water exchange through the Clyde and Forth estuaries, led to poor quality in parts of these estuaries in the late summer, and hence a substantial overall net quality downgrading. This reversed some but not all of the gains seen in the two earlier years.

Coastal Waters

The net length of unsatisfactory class C & D coastal waters was reduced by 64.5 km in 2003, giving a total reduction of 172 km since 1999. Quality in 2003 was undoubtedly helped by the reduced run-off resulting from the dry weather, but if it can be maintained then the overall improvement target for the period 1999 – 2006, which is a 145 km reduction, will be met.

For coastal waters, it is now virtually certain that SEPA's 2006 coastal waters quality target will be met. 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. The dry weather in 2003, helped by the actions of SEPA and others to curb diffuse pollution sources undoubtedly also contributed to the improvements.

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 (Annex1) 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 coasts 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; these new targets are to be achieved by 2006. The purpose of this paper is to examine progress towards attainment of the 2006 targets.

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 remain unchanged, but are now expressed for a Digitised Rivers Network (DRN), which includes the same river systems as before plus islands' rivers, 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 (initially only to SEPA staff, but from June 2004 also to the public). 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 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, if the new sites are found to be not of good quality, then the cause of downgrading will be investigated and action taken in the normal way. Secondly, the current allocations of river stretches to monitoring sites for quality class assignment will be reassessed, and extended where that is appropriate. By these means, for 2003, over 2000 km more of river length was classified for the first time.

Looking across the present outcomes for all water types, it is interesting to note that the 2003 results share several features in common with 2000. Superimposed on a generally improving trend, both 2000 and 2003 showed larger than average improvements in both rivers and coastal waters quality, but suffered a decline in estuarine quality. Both 2000 and 2003 were relatively dry during critical periods of the year. Conversely, 2002 was notably wet, and river and coastal improvements were less than might otherwise have been expected, while estuarine quality was easily the best ever recorded, dominantly due to high freshwater inputs to the Forth and Clyde estuaries resulting in good oxygenation throughout the summer months.

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 EC Water Framework Directive 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 pleasing to note that in 2003, the total length of class B rivers is over 200 km shorter than in 1999, despite the substantially increased extent of classified waters.

Following assessment of attainment of SEPA's 2006 WQ targets early in 2007, it is anticipated that from 2007 onwards, entirely new Water Framework Directive (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 hoped to be able to also apply the SEPA classification schemes to the 2007 quality monitoring data.

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 coastal waters, and the area (in square kilometres) of estuaries, there are four quality classes; Excellent, Good, Unsatisfactory (fair/poor) and Seriously Polluted (classes A, B, C, D respectively). Examples are given to illustrate 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 main 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 2003 (DRN)

	Year	A1 Excellent	Unclass -ified	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*	3171.5	12815.6	6087.2	2453.2	853.9	73.4	25454.6
(%)		(12.5)	(50.3)	(23.9)	(9.6)	(3.4)	(0.3)	100.0
Length km	2001	3874.5	11960.1	6324.9	2339.1	929.4	82.5	25510.5
(%)		(15.2)	(46.9)	(24.8)	(9.2)	(3.6)	(0.3)	(100)
Length km	2002	5279.4	7987.9	8655.5	2562.7	902.9	56.3	25444.7
(%)		(20.1)	(30.5)	(33)	(9.8)	(3.4)	(0.2)	(100)
Length km	**2003**	**6815.2**	**5903.3**	**9540.4**	**2373.8**	**750.8**	**52.6**	**25436.1**
(%)		**(26.8)**	**(23.2)**	**(37.5)**	**(9.3)**	**(3.0)**	**(0.2)**	**(100)**

Actual length of classes C and D in 1999	**1169 km**
Actual length of Classes C and D in 2003	**803 km**
Target length of Classes C and D 2006	**818 km**
Actual change in length of Classes C and D 1999 to 2003	**- 366km (-31%)**
Target change in length of Classes C and D 1999 to 2006	**-351km (-30%)**

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

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 years basis unless problems requiring investigation are found. Most of these newly monitored waters have been found to be of either excellent (A1) or good (A2) quality (see the large increases in the length of class A1 and A2 waters), but 34 km in relatively unpopulated upland areas of South-west Scotland were found to be of unexpectedly poor (class C) quality, and are now being investigated. Note also the decrease in the length of class B waters as they have improved to either class A1 or class A2. These latter improvements are mainly due to improved biology scores and could be a result of a lower diffuse pollution load in what was a year of low rainfall.

Improvements

In Thurso team area, 2km of the Milton Burn near Wick improved from class C to class B. An Action Plan in the catchment has delivered improvements through farm inspections and provision of pollution control advice to farmers. The Action Plan is continuing through 2004/2005 and improved water quality is expected to be maintained following tighter controls on the spreading of distillery waste in the catchment.

In the Fraserburgh team area, 6.6 km of the Burn of Savoch at Millhill improved from class C to A2. This follows the closure of a put-and-take fish farm in the catchment and a reduction in agricultural pollution.

Much of the net reduction in class C and D rivers in 2003 was in South-east Scotland, with one-third of the national total improvement recorded in Fife alone. It is suspected that it is not a co-incidence that it was these parts of Scotland which were particularly dry in 2003. Lower rainfall implies reduced potentially polluting run-off from both paved urban areas (including roads) and farmland. However, several of the recorded improvements clearly followed SEPA work and Scottish Water investments.

In East Fife, 6 km of the Kinness Burn has improved from class C (poor) to class B (fair) water quality due to improvements completed at Kinness waste water treatment plant (WWTP), while further west in Fife 15.4 km have improved due to Scottish Water's sewerage improvements along the River Ore and repairs to leaking sewers, combined sewer overflow (CSO) upgrades, and general improvements. (Combined sewers are those which take both sewage and surface water run-off from roofs, roads and other paved areas. Unless overflows are provided, they would deliver to treatment plants far more volume than they could possibly deal with. New developments in Scotland are now built with more sustainable urban drainage schemes, but to rebuild existing drainage infrastructure would be an enormous task).

In Clackmannan, the Black Devon has improved from poor to fair water quality. There have been new filter beds installed at Saline WWTP. Enforcement action by SEPA has resulted in storm tanks being fitted with an automated emptying function. These improvements may have had an effect on downstream water quality, thus attributing to the 14 km improvement from class C to B. The drier weather may have been a factor in a number of these upgrades, but there are other plausible explanations. Operations have ceased at Cooper Industrial site, leading to 5 km of class B being upgraded to class A2.

In Stirlingshire, the Duchray Water upstream of the Forth, River Forth at Parks of Garden, and the Annet Burn have all recovered from previous farm pollution incidents, resulting in 8 km of Duchray Water being upgraded from class B to A2. 21km of the River Forth and Annet Burn have now recovered from good to excellent quality.

The improvements in water quality in the Falkirk area may be attributed to the dry weather experienced in 2003. These stretches are typically downgraded due to pollution from abandoned mines. The low flows of 2003 lead to decreased flushing of polluting iron-rich solids from affected streambeds, and hence better compliance with the total iron environmental quality standard. If the low total iron results of 2003 were unrepresentative, then deterioration in wetter years can still be anticipated.

In the Edinburgh and Lothians area, many of the rivers which improved from class C to class B are influenced mainly by a combination of diffuse agricultural and urban run-off. SEPA has been working to reduce these pressures, but the dry weather was helpful as well. The Swanston Burn (3.5 km) is also impacted by a local golf course, in addition to agricultural and urban run-off from the neighbouring town.

In West Lothian an improvement of 3km on the Dechmont Burn was most likely due to work carried out to minimise polluting run-off from Deans Industrial Estate. In addition, the Breich Water (3.3 km) has improved because the new Cuthill minewater pumping station has been commissioned, so water from this abandoned mine area is now being treated. There was a significant pollution incident on the River Almond near Whitburn in October 2002 at the A706 in Whitburn, and the 1.4 km improvement along this stretch is probably a result of the affected burn recovering from this incident.

Numerous significant water quality improvements were recorded in the west of Scotland. The Mein Water in Dumfries lies within an intensively farmed catchment and suffers from episodic diffuse agricultural pollution. Farms located within the catchment are regularly inspected or visited and problems addressed. A new monitoring site was added at B725 Road Bridge to better represent the river in this area. As a result, the amount of class C (poor) quality river has decreased.

The Dow Lochar, near Dumfries, is also a livestock farming catchment and this together with the urban drainage from the Georgetown district of Dumfries suggests a vulnerable catchment. In addition this watercourse has point source discharges and suffers occasional resectioning. Further biological monitoring of the Dow Lochar took place in 2003 to assess if any particular pollution source was pre-eminent.

A major farm input to the Pouton Burn near Garlieston, Galloway was identified in 2002 as causing a substantial downgrade. Improvements have now been made to the discharge and water quality has improved in 2003.

An unsatisfactory sewage discharge from Sorbie WWTP had been downgrading approximately 3km of the Inch Burn, Galloway. Reed beds have subsequently been installed at the works and the catchment has been subject to intense farm inspections as part of the Bathing Waters/Coastal Streams Action Plan. As a result of this work, the water quality has improved from class C to B.

Approximately 3km of the Lugton Water, Ayrshire was badly affected by the discharge from Uplawmoor WWTP. Improvement work and investment was scheduled under Scottish Water's second quality and standards investment program (Q&S2) and has resulted in water quality upgrading from class C to class A2 this year. However, the receiving water still affords little effluent dilution, especially in the summer months.

The water quality monitoring point on the small tributary of the Capelrig Burn, East Renfrewshire, was relocated in 2002. The original monitoring site was strategically placed to monitor the effects from an active quarry upstream. Pilmuir Quarry has been closed for a number of years, and it was felt the downstream monitoring site was no longer representing the catchment. Water quality at the new monitoring site is classed as A2 (good).

The Lees Burn, East Kilbride, has seen a significant reduction in organic and ammonia pollution since mid 2001. This has helped improve the river from class C to class B in 2003.

In the South Calder Water there is a low probability of sustaining the ecological improvement recorded this year. The lower part of the river was classed B in 2001, class C in 2002 and now class B in 2003. However, there is hope for long-term improvement in the area as a result of the regeneration of the former Ravenscraig Steel Works site.

A long-term fly tipping problem has existed on the Kennel Burn, North Lanarkshire. SEPA has liased with landowners and the local authority and suggested measures to mitigate the impact. As a result, the local authority has erected a gate to stop vehicular access to the watercourse. The result has been a dramatic reduction in the amount of non-sewage derived debris. Unsatisfactory combined sewer overflows (CSO) in the area are also due to be upgraded by early 2006.

A total length of 18.7km of watercourses within the River Kelvin catchment has been upgraded from lower water quality classes for 2003. The River Kelvin at Springfield Farm Bridge is the first SEPA monitoring site on the main river downstream of the

confluence with Luggie/Bothlin catchments. The improvements in water quality at this site, and others further downstream at Torrance and Bardowie have been attributed to the closure of several waste water treatment plants (WWTP) in the upstream catchment.

Several sites on the River Kelvin upstream of the Luggie/Bothlin confluence are also showing a steady improvement. This illustrates the continued improvement of the catchment.

On the Luggie Water, the closure of Cumbernauld's Deerdykes WWTP in January 2002 has lead to continued improvement in overall downstream water quality. Chemical water quality parameters had shown almost immediate improvement. Biological quality took longer to recover, but has now also improved. The river is slowly recovering following the removal of the sewage effluent discharge. The most downstream monitoring site at the foot of the Luggie Water, below its confluence with the Bothlin Burn, has shown some level of ecological recovery, but is not yet of good quality.

Water quality in the Bothlin Burn was affected by the discharge from Auchengeich WWTP, which closed in March 2003. Since then, chemical water quality has improved dramatically. Some results are showing a one hundred-fold reduction in ammonia levels in the river, coupled with an increase in dissolved oxygen. Eventually the ecological quality of the Bothlin Burn should also improve. SEPA are continuing to collect representative post-closure samples in 2003/04.

Deteriorations

Not all recorded water quality changes were positive. Numerous streams of borderline quality inevitably fluctuate between adjacent classes, but in addition to this there were additional problems found through the monitoring of previously unmonitored waters, and some changes due to pollution sources. In the Thurso team area the Gillock Burn deteriorated from class B to C. The main cause of pollution in the catchment is the discharge of sewage effluent from three septic tanks. A reed bed is currently being installed by Scottish Water to improve effluent quality and it is expected to be operational by the summer.

3.4 km of the lower River Nairn was downgraded from class A1 to class C due to failure of the EQS for the pesticide diazinon. The failure is being investigated although diazinon is used in timber treatment and sheep dippers, and in the past also as a general pesticide, so there are potentially many sources of pollution.

In Aberdeen North team area there has been deterioration in the quality of the Tuach Burn near Kintore. The team are aware of specific pollution problems in the catchment and are working on remediation.

In the Angus Area, the Brothock Water has had some flood prevention maintenance undertaken in 2003 by the local authority. This involved dredging the riverbed, thus leading to stripping of habitat, and this is reflected in the poor biology result. It is likely that recolonisation is ongoing. Activities such as this highlight the conflict between maintaining flood prevention structures and protecting habitats.

A 3.3 km stretch of the River Earn in Perth has been downgraded due to a seasonal finding of the pesticide diazinon, which in this case appears more likely to have had an agricultural source.

In the Fife area, the Den Burn appears to be suffering increasing ferruginous inputs from fomer mine workings in the forested Tullylumb Plantation area. SEPA have recognised that further investigation is required to quantify the problem. The low flows will have

contributed during 2003 as the ferruginous discharges are likely to be fairly constant in flow and Iron (Fe) content while the available dilution in the burn was reduced.

Both the Dreel Burn and Kenly Water have alternated between class C and B since 1999. The 2003 class C result perhaps more accurately reflects the water quality of these heavily farmed catchments than the class B recorded for 2002.

A 6.6 km downgrade from class C to class D of the Lochgelly Burn downstream of Cowdenbeath was due to mechanical breakdown of Cowdenbeath's sewage pumping station. During 2003 this caused several overflows of untreated sewage into the burn. Long periods of low flow further exacerbated this unsatisfactory situation. Scottish Water is currently undertaking extensive remedial works at the pumping station to re-establish acceptable performance.

The Caldrons Burn in Galloway has deteriorated in 2003. Following recent success in the Galloway area, the positive environmental outcome is to raise quality of all watercourses from C (poor) to B (fair) via farm improvements in terms of farm management; farm practices, farm waste storage and pollution prevention. The monitoring site on this watercourse is downstream of the final effluent from Stoneykirk WWTP. Improvements are already underway as part of Scottish Water's Q&S2 capital works program and the provision of a reed-bed should reduce the impact on the waterbody.

Both the Pow and Rumbling Burn (Ayrshire) catchments are prone to frequent class change. The results from monitoring completed in September 2003 show the waters had low dissolved oxygen levels. Typical oxygen levels in these rivers are normally around 80-90% saturation. At the time of sampling the waters were experiencing low flow conditions as a result of a very dry summer. Low flows afford little dilution to discharges and as result ammonia and organic material levels (which both reduce oxygen concentrations in the water) were higher than normal.

The Dippool Water (Mouse Water catchment, Clyde Valley) is 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 coat the riverbed, smothering invertebrates. Iron levels in the catchment are currently above the environmental quality standard, which results in SEPA allocating the river to class C (poor). A Mouse Water minewater remediation treatment system is being progressed by the Coal Authority and should be complete by the end of 2004. SEPA has an Action Plan to monitor the Douglas, Dippool, and Mouse waters to hopefully record improvements resulting from the new minewater treatment schemes.

The White Cart Water is now class C (poor) from the Kittoch confluence to Corkerhill Bridge (approximately 15km). The poor water quality recorded at Corkerhill Bridge in 2003 has been attributed to the sewage effluent arising from Philipshill WWTP, which serves East Kilbride. Scottish Water have planned investment for the works under the current Q&S2 process. However, SEPA are seeking to enforce even tighter ammonia standards. Under Q&S3 (2006/7-2013/14), it is possible that the discharge may be diverted to the River Clyde via the Allers outfall by 2008.

The Espedair Burn joins the White Cart at Paisley. This burn is generally of fair quality, but throughout its length is subject to combined sewer overflow (CSO) discharges which compromise water quality. The current downgrade due to aesthetic pollution is due to gross litter on the riverbank and in the watercourse. The litter consists mainly of motor vehicle parts and general non-sewage debris. Recently, the local authority has been proactive in clearing the river and SEPA officers have noted a significant reduction.

The Kittoch Burn at Kittoch Bridge is class B (fair) for chemical water quality parameters, but is overall downgraded to class C (poor) due to its poor ecological quality. Like many of the East Kilbride Burns, the Kittoch suffers from sewage pollution as a result of cross connecting sewerage/surface water drains, and oily road run-off.

Most of the East Kilbride burns will remain either class C or class D until at least 2006, despite the installation of sewer switches and major de-dualling work by Scottish Water in recent years. Sewage contamination still occurs in spite of these investments, and affects 17.5km of controlled waters around East Kilbride. The SEPA/Scottish Water Action Plan continues into 2004.

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

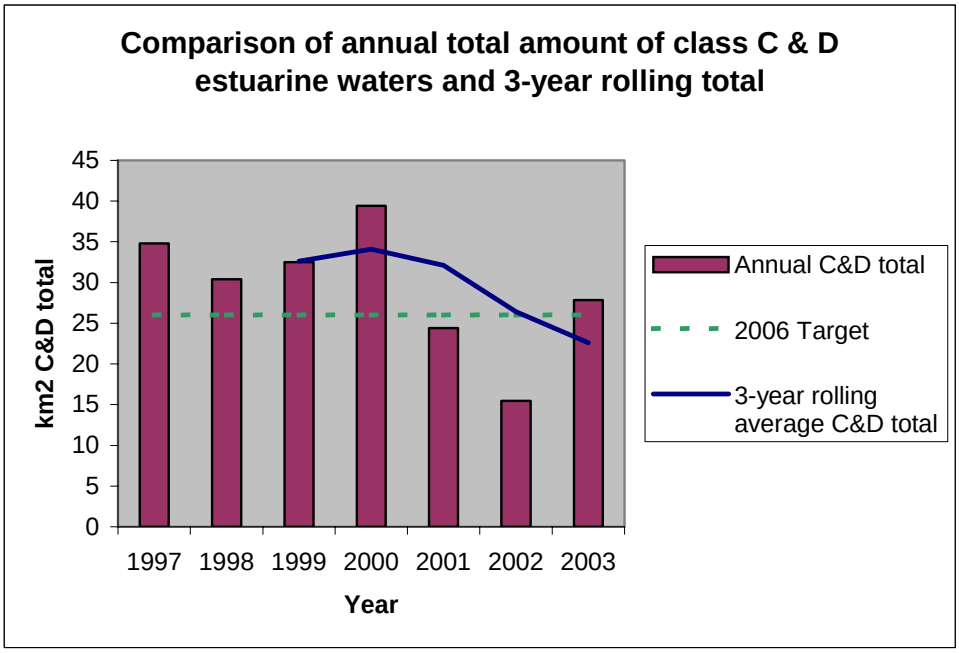
Overall estuarine water quality data for 1999 – 2003 is shown in table 2 below. The outcome was less good in 2003 than in 2002, with this change clearly due to the drier summer weather in 2003. Warning was given with the 2002 results that they were exceptionally good due to the wet weather that year. It is because of these clearly weather induced changes that a three year average figure has also been included in the summary to this report, as this gives a clearer picture of the continuing overall trend of gradual improvement. The sediments of Scotland's major industrialised estuaries will continue to carry a burden of organic matter and more toxic contaminants from historic discharges, for many years to come.

Table 2: Estuarine water quality classification for the years 1999 to 2003

	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)**

Actual area of classes C and D in 1999	**32.5 km²**
Actual area of Classes C and D in 2003	**27.9 km²**
Target area of Classes C and D 2006	**26 km²**
Actual change in area of Classes C and D 1999 to 2003	**-4.6 km² (-14%)**
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:



Improvements

In the north of Scotland, the area of unsatisfactory estuarine water was little changed in 2003, but local targets will be achieved if the quality of Aberdeen Harbour can be upgraded from class C to B by 2006. A current Action Plan involving SEPA's Aberdeen South Team and the Harbour Authority aims to secure this upgrade by 2006.

Further south on the East coast, during the period 1999 to 2003 there has been no increase in the extent of class A (excellent) waters, but there has been an increase of 2.8 km^2 of class B (good) estuarine waters. Also during the period 1999 to 2003 the length of class C (unsatisfactory) and class D (seriously polluted) has decreased by 2.5 km^2 and 0.3 km^2, respectively.

The new secondary treatment facility and screened CSO at Montrose WWTP are now operational and the previous unscreened sewage discharges have ceased. However, a section of the estuary at Montrose Beach front and the mouth of the South Esk remains class B due to reduced biodiversity. A survey to confirm the biological status here was completed in September 2003; the report is expected in May 2004. In the meantime this 1 km^2 area will remain class B.

The Tay estuary is mainly class A with a 17.7 km^2 section in the Dundee area that is downgraded to class B. The Tay Wastewater Scheme was operational throughout 2002 and led to significant improvement in water quality. There is a possibility that the remaining class B could be upgraded to class A. It has been recognised that this will have to be investigated over the next few years and may have to wait until improvements are in place at Tayport and Newport, which have to be in place by December 2005 at the very latest.

The only upgrade in the Forth area was in the Carron Estuary (0.1 km^2). This has been upgraded to class B as a result of the continuing slow reduction in prevailing concentrations of the toxic pesticide lindane, which was once extensively used in this area as a wood preservative.

The Forth and Tyne estuaries are not expected to achieve class A due to their intrinsically turbid nature and the number of industrial and domestic waste discharges they receive. However potential improvements that could occur in the future include improvements at Inverkeithing Bay due to the closure of Inveresk's Caldwell Papermill at Inverkeithing, as well as the gradual improvements of the mudflats around Grangemouth. The improvements around Grangemouth are a result of improved effluent treatment and decreases in waste discharges to the area. However, recent evidence suggests that biological quality in the area may have stabilised, so the likelihood of future improvements remains uncertain.

The classification of the lower Forth Estuary is class B due to the continuing, though reduced amounts of sewage litter, and the residual low levels of persistent substances in shellfish exceeding twice the national background concentrations.

Part of the Grangemouth mudflat area remains in class C (6.0 km^2) due to aesthetic pollution and organic enrichment. Inverkeithing Bay also remains class C (0.3 km^2) in 2003. It was last upgraded in 2000 following improved sewage collection which resulted in much less sewage derived solids aesthetic pollution, decreased organic enrichment of the sediments and substantial improvements to the treatment of paper mill waste. However, Caldwell's Papermill closed in 2003 so there is no longer any discharge and in time further improvements should be observed.

In the Rough Firth area of the Solway, the small area of the EC identified bathing water was upgraded to class A. However, impacts from the septic tank at Auchencairn still result in small areas of class C and B due to low dissolved oxygen levels and fungal growth.

In the lower Clyde Estuary main shipping channel waters, recorded concentrations of dissolved oxygen were higher, resulting in an upgrade of 1.4 km^2 from B (good) to A (excellent) quality.

In the Gareloch, high dissolved oxygen levels throughout the year resulted in almost half the loch reverting to class A. Aesthetic problems from sewage solids and other litter, and benthic faunal impacts around the head of the loch and some coastal fringes have kept areas downgraded as in 2002. Above background concentrations of polychlorinated biphenyls (PCB) are still found in mussels at Shandon, giving class B quality.

Deteriorations

The biggest estuarine quality changes in 2003 were unfortunately negative, but these can be clearly attributed to the uncommonly low summer river flows. In both the Forth and Clyde estuaries significant areas suffered low dissolved oxygen concentrations, which fell below SEPA's environmental quality standard, and threatened fish life, though in contrast to the very bad conditions which regularly occurred in dry summers of the 1980's, no fish mortalities were recorded.

The middle to upper stretches of the Forth Estuary between the Black Devon and Longreach (5.7 km^2) have been downgraded from class B to class C for 2003 due to the low oxygen concentrations recorded in the late summer.

Less poor, but still low oxygen concentrations also caused the Longreach to Stirling uppermost stretch of the Forth Estuary (1.5 km^2), and an area between the Black Devon and Kincardine to remain class B.

The water quality in the Clyde estuary was good until early September 2003 but then oxygen levels dipped dramatically especially in the inner estuary. This resulted in a downgrade of 6.45 km^2 from B to class C between Glasgow and the Leven confluence.

Aesthetic conditions in the upper estuary remain a significant problem with several CSO spilling too frequently. Foaming has been a feature near Dalmuir WWTP throughout the year.

Pockets of persistent substances (trace metals and PCB) continue to be recorded with associated downgrades at Ardmore, Cairndhu, Portkill, Ashton, Culwatty Bay, Garvel and Cloch. These are likely to have a historical component deriving in part, from estuary sediments.

In the White Cart Estuary off the Clyde, there has been a foaming problem at Paisley WWTP that has adversely affected receiving water quality. Full analysis of benthic faunal data has resulted in slight upgrades from class D and C. Only 0.125 km^2 remain in class D and 0.015 km^2 in class C. Sewage solids (aesthetic pollution) from several CSO in the upper reaches and benthic stress dominate the outcomes.

Further downstream off the Clyde, analysis of benthic faunal data has resulted in a downgrade of parts of the Leven Estuary from class A in 2002. In 2003 0.12km^2 became class B, 0.25 class C and 0.125km^2 class D.

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 respectively. Further quality improvements arising from these programmes will be delivered, and notwithstanding the positive help given by the dry weather of 2003, the overall improvement target for 2006 should be surpassed. These improvements have also been reflected in the quality of Scotland's bathing waters, as has been recorded and published in SEPA's annual bathing waters monitoring reports. SEPA working both directly and through others involved with farms and farming communities is also seeing reductions in diffuse run-off from some rural sources into coastal bathing waters.

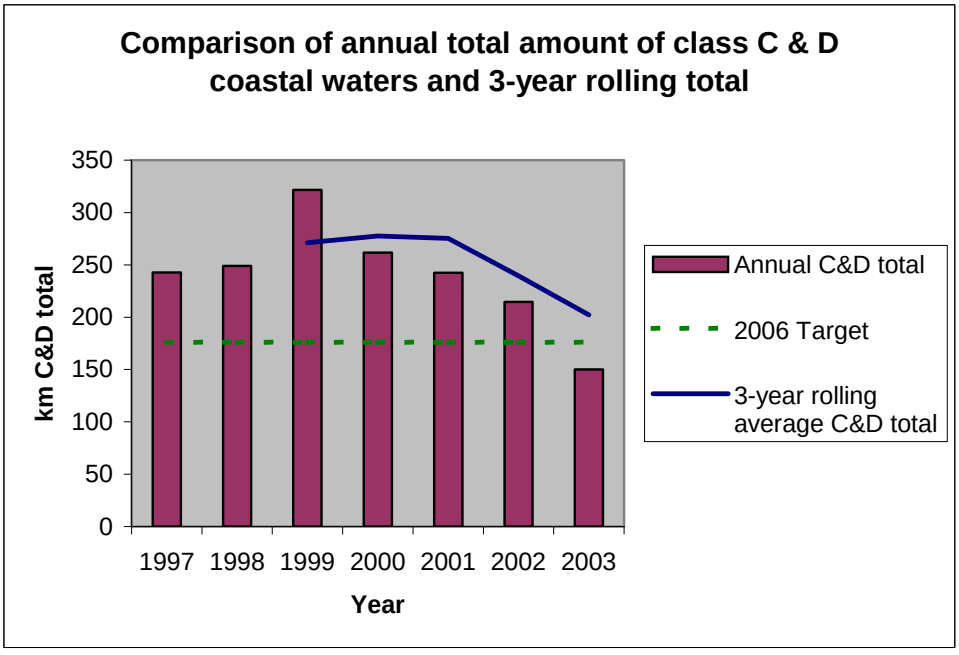
Table 3: Scottish Coastal waters classification for the years 1999 to 2003

	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)**

Actual length of Classes C and D in 1999	**322 km**
Actual length of Classes C and D in 2003	**150 km**
Target length of Classes C and D 2006	**176 km**
Actual change in length of Classes C and D 1999 to 2003	**-172 km (-53%)**
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 previously unavailable data for some islands.
* 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:



Improvements

The coast around Sandness in Shetland was improved following sewerage works undertaken by Scottish Water. Elsewhere in the North-east of Scotland, upgrades from class C were related to improvements to sewage treatment, for example provision of secondary treatment at Lossiemouth and relocation and screening of the sewage at Portsoy in the Elgin team area.

Further improvements can be expected in the North-east next year. Nearly all the significant coastal towns and cities between Inverness and Aberdeen are now being served by effective new WWTP commissioned in the last three years and further sewerage infrastructure improvements are planned between now and 2005.

Further South on the East coast, Arbroath Victoria Park has been upgraded to class B from class C following the commissioning of the Hatton WWTP. Carnoustie is served by the same works, and in 2003 it was improved to class B as a result of continued improvements following the commissioning of the new works.

The 0.8 km stretch of class D at Buckhaven has been upgraded to class C due to the extensive improvements associated with the new Levenmouth treatment works and associated sewerage infrastructure, which is gradually eliminating previously inadequately treated discharges from this area of Fife.

Coastal stretches at St. Cyrus, Largo East and Kirkcaldy (Linktown) again failed to meet acceptable bacteriological quality standards in 2003, so these stretches of coast remain class C. However, the source of the longstanding problem at Kirkcaldy was tracked down during the year, and the problematic sewer overflow thoroughly blocked with concrete to prevent any possible pollution from this source, and a consequential upgrade for 2004 is anticipated.

A stretch from Dalgety Bay to Braefoot has improved to class B in 2003. This is an industrial section of coastline with Exxon and Shell jetties and associated authorised discharges, but the former Dalgety Bay WWTP has now been converted to a pumping station and removal of this treated effluent (to Dunfermline) has had a positive impact. The general water quality appears good as indicated by the presence of shoals of small fish, seals, and seabirds.

Around Cramond, water quality improved in 2003 following the installation of a new pumping station. An inspection of this new station indicates that it is functioning satisfactorily so coastal water quality at this site should continue to improve over time.

The EC identified bathing water at Portobello West (Kings Road), has been upgraded to class B, from class C in 2002, following continuing work to reduce inputs to the Figgate Burn, and consequent improved water quality in 2003.

Longniddry achieved mandatory EC bathing water standards with only trace amounts of sewage debris now being observed. Sewage arising in Longniddry is now pumped to Edinburgh for treatment and the old works are being used to ensure improved treatment of storm overflows from the Longniddry system.

Slightly further east, there have also been continued improvements at Gullane Point to Longniddry so this shoreline has improved to class A from class B in 2002.

Eyemouth has also benefited from the new WWTP serving this area, and the local coastal waters have been upgraded to good, class B quality.

Moving round to the West coast, 2003 saw major stretches of South West Scotland coastline upgraded to classes A and B from class C
.
Intensive work in Loch Ryan, related to previous findings of traces of the toxic anti-fouling compound tributyl tin (whose use is now banned), indicated reduced biological impact since 2001 allowing upgrades on several kilometres back to class A (excellent), and a small amount to class B (good).

Significant changes to sewerage infrastructure along with microbiological improvements in recreational or bathing waters on Bute, along the Ayrshire coast, and at Inveraray and Carradale, resulted in major coastline upgrades into classes A or B. These are substantially the result of the major new waste water treatment plants at Meadowhead and Stevenston and the work being done with farmers to reduce polluting agricultural run-off. Improved quality associated with a previously problematic industrial discharge at Girvan also led to a small upgrading in this area.

Just North of Oban, a review of offshore benthic impacts in Loch Creran due to the potential impact from fish processing demonstrated that this discharge is now adequately treated, resulting in a small upgrading from class B to class A.

North-west Scotland contributed significantly to the good figures for 2003 with the improvement of 24km of shoreline in the Kinlochleven area of Loch Leven in the Fort William team area. The downgrade had been due to elevated levels of polyaromatic hydrocarbons (PAH) remaining in the environment many years after the closure of the aluminium smelter. The Government's Fishery Research Services Marine Laboratory supply SEPA with the results of annual survey work on PAH in that area and the 2003 results, which show a continued gradual recovery to levels below the Environmental Quality Standard, allow the downgrade to be removed.

At Lochcarron in Wester Ross, 2 km of coastline is upgraded from class C to A, following installation of a new sewerage system to eliminate local pollution problems.

Deteriorations

There were remarkably few negative coastal water quality changes in 2003. At just two sites in Dumfries and Galloway (Brighouse Bay and Sandhead) deterioration in microbiological quality resulted in a downgrade of some class B waters to class C, unsatisfactory quality. The farm related problems in the Brighouse Bay catchment are being rigorously tackled, including through a Scottish Executive funded project, to investigate the effectiveness of innovative new techniques for dealing with lightly polluted farm water run-off.

5. Conclusions

2003 saw further improvements in water quality across Scotland. Looking beyond the one-year changes and classification fluctuations, some of which (particularly in estuaries) are affected by uncontrollable factors such as rainfall totals, 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

quality improvement Action 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. Scottish 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. An important development in this is the planned launch in June 2004 of on-line access to maps showing the quality of rivers as reported here. Soon after that, WFD assessments will start to become available, starting in July 2004 with the launch of a public consultation on the first WFD "characterisation" of all relevant Scottish waters. It is inevitable, for various reasons, that this will present an apparently less rosy view of the quality of our water environment.

Perhaps the most significant reason 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 bathing water may be only a small part of a relatively large coast water body, but causes it all to be regarded as “at risk”.

SEPA is working with several other organisations to produce the first characterisation report, and your comments on the consultation version will be appreciated.

End.