

Indicator name			Version
NB24 Proportion of water bodies not meeting Good Overall Status			July 2016
Indicator type:	Risk/opportunity	Impact	Action
	X		
SCCAP Theme	SCCAP Objective	CCRA risk/opportunity	
Natural Environment	N2 Support a healthy and diverse natural environment with the capacity to adapt	Over-arching resilience indicator of water quality <ul style="list-style-type: none"> • BD13 Water quality and pollution risks • BD14 Ecosystems risks due to low flow and increased water demand 	

At a glance

- Water bodies which are not in good overall condition are likely to be less resilient to additional pressures due to climate change and therefore less able to provide a healthy resource that can benefit wider climate change adaptation.
- Between 2008 and 2014, all water body types showed no overall increase in the number of sites failing to meet good status, with significant improvements particularly in coastal water bodies (though changes in the assessment methodology make it difficult to assess the significance of any changes).
- Some real improvements have been secured, largely by e.g. requiring licensed operators to reduce impacts arising from discharges of pollutants or water abstractions; collaborative working to remove barriers to fish migration.
- The River Basin Management Plan process aims to reduce the pressures on water bodies in a sustainable way via a legislative framework, supported by economic incentives and funding and education to promote, encourage and support action.

Latest Figure		Trend		
Proportion* of water bodies not meeting Good Overall Status (2016):		Change in proportion* of sites not GOS		
			2012-2016	2008-2016
Rivers (2409)	46%	Rivers	↑2.1%	→0%
Lochs (334)	36%	Lochs	↓1.5%	↓1.7%
Estuaries (48)	15%	Estuaries	→0%	→0%
Coastal (457)	0%	Coastal	↓2.2%	↓6.1%
Groundwater (403)	21%	Groundwater	↓3.5%	N/A [#]
*Proportion is based on numbers of sites not area		*Proportion is based on numbers of sites		

<p>Data is for both the Scotland and Solway Tweed River Basin Districts</p> <p>(Total number of water bodies in brackets)</p> <p>36% of all groundwater and surface water bodies do not meet Good Overall Status (SEPA, 2016)</p>	<p>Data is for both the Scotland and Solway Tweed River Basin Districts.</p> <p>NB Changes are partly due to improvement of understanding of the water environment and adjustments to assessment methodology (see 'Interpretation of indicator trends' for detail)</p> <p># All the groundwater bodies were redefined in 2012. No historical data for the <i>current</i> groundwater bodies are available before 2012.</p>
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Why is this indicator important?

Scotland is renowned worldwide for the environmental quality of its water resources. Its water habitats support a great diversity of habitats and species, and some of these are of national and international importance. They also provide benefits essential to Scotland's health and prosperity for example, by providing drinking water, water for use in industries such as whisky making and fish farming, energy from waves, tides and hydropower, and recreation opportunities. Scotland's water environment is an 'integral part of Scotland's cultural fabric' (Scottish Government, 2009).

Projected climate change will have significant direct and indirect impacts on Scotland's water environment e.g. rising mean water temperatures and an increase in extreme temperature events; an increase in high intensity rainfall events and/or summer low flows. The ability to withstand these additional stressors and maintain important ecosystem functions will to a great extent depend upon their general condition. The Scottish Government (2013) identify the need to improve the condition of the water environment in order to make it both more resilient in itself to the consequences of climate change as well as to provide a healthy resource that can benefit wider climate change adaptation.

The monitoring of the status of Scotland's water environment is a requirement of the European Water Framework Directive and is carried out on behalf of Scottish Government by the Scottish Environment Protection Agency (SEPA). The Directive requires a broader and more holistic approach to the monitoring of water quality than previously. Under this monitoring, water management units, otherwise known as 'water bodies' are identified. Each year, each water body's overall status is classified as being either: High, Good, Moderate, Poor or Bad¹. The purpose of the classifications is to show where the water environment is in a good condition and where improvements need to be made. The classification of surface water bodies shows how much their condition differs from near natural conditions, with water bodies in a near natural condition being of High status and those whose ecological quality has been severely damaged as in Bad status. The classification of groundwater describes whether or not waters are polluted and whether or not the volume of any water abstracted from them is sustainable. Two classes are used to describe the status of groundwater - Good and Poor.

This indicator reports on the proportion of water bodies not meeting Good Overall Status, in other words, those classified as being in Moderate, Poor or Bad status under SEPA's classification system (see below for details). This indicator is important as it provides an understanding of the likely

¹ Water bodies which are heavily modified by human activities are assigned an overall status of maximum, good, moderate, poor or bad ecological potential. For simplicity, these have been presented as high, good, moderate, poor or bad

resilience of water bodies to the pressures of climate change, with those not meeting Good Overall Status likely to be less resilient than those which do meet this standard.

Related indicators:

NB33 Progress towards the environmental objectives of the River Basin Management Plans

NA14 Freshwater bodies affected by diffuse pollution due to agriculture

NB39 Freshwater habitats with reported presence of key invasive non-native species (INNS)

What is happening now?

Approximately 46% of Scotland’s rivers and 36% of lochs are currently failing to reach ‘good’ status (Figure 1). This is largely due to loss of habitat as a result of development (historic and ongoing); nutrient enrichment and habitat loss due to agriculture; and energy production disrupting the natural movement of water (Critchlow-Watton et al, 2014). Since the previous year (2015), 83 rivers and 4 lochs have deteriorated in assessed status, whilst 89 rivers and 8 lochs have improved in condition².

Estuaries and particularly coastal waters show a significantly better picture with regard to water quality, with only 15% of estuary sites and less than 1% of coastal assessment sites remaining in less than good status (Figure 1). The main challenges faced by the coastal and transitional environment are: commercial fishing; localised pollution due to the aquaculture industry; loss of coastal and estuary habitat to development; and diffuse pollution of estuaries and coastal areas (Critchlow-Watton, 2014).

Approximately 21% of groundwater bodies are currently assessed as not reaching good status. These water resources are largely under pressure from agricultural inputs; water abstraction; pollution from historic mining and industrial activities (Critchlow-Watton, 2014).

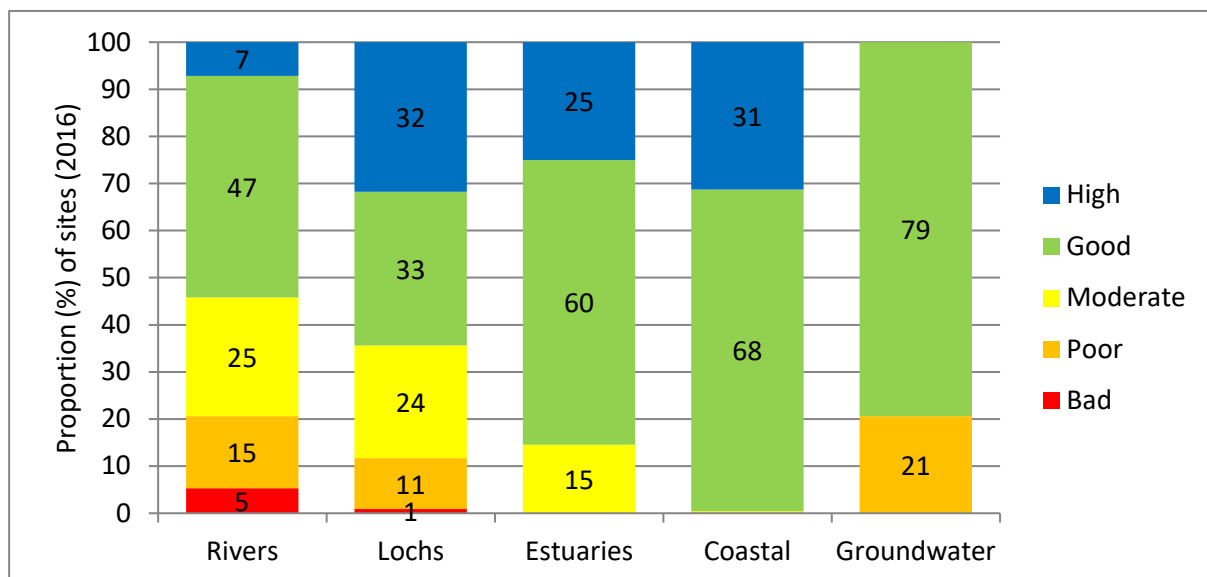


Figure 1 Latest (2016) overall status of waterbody sites in Scotland as a proportion of total

² See ‘Interpretation of indicator trends’ section below

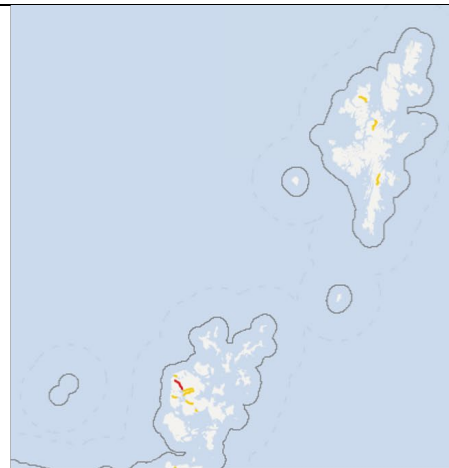
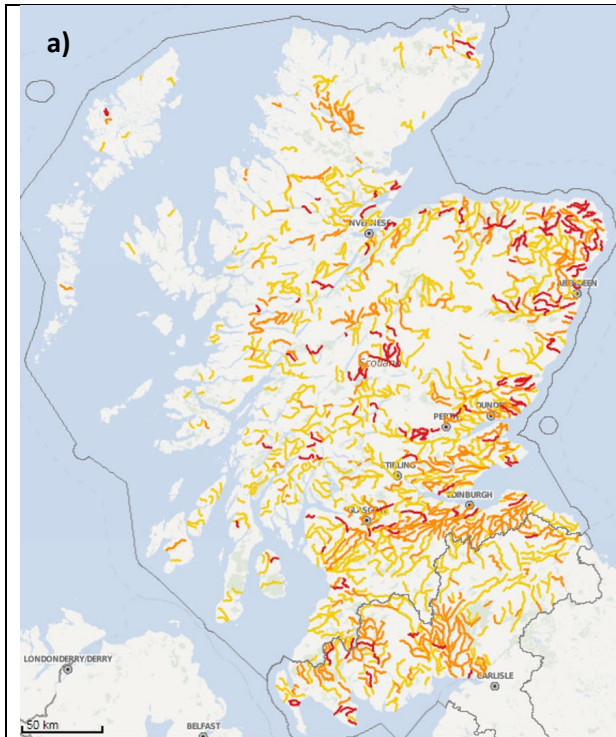


Figure 2 Scottish water bodies at less than Good Overall Status, 2016: a) Rivers; b) Lochs; c) Estuaries; d) Coastal; e) Groundwater. Source: SEPA (2018)



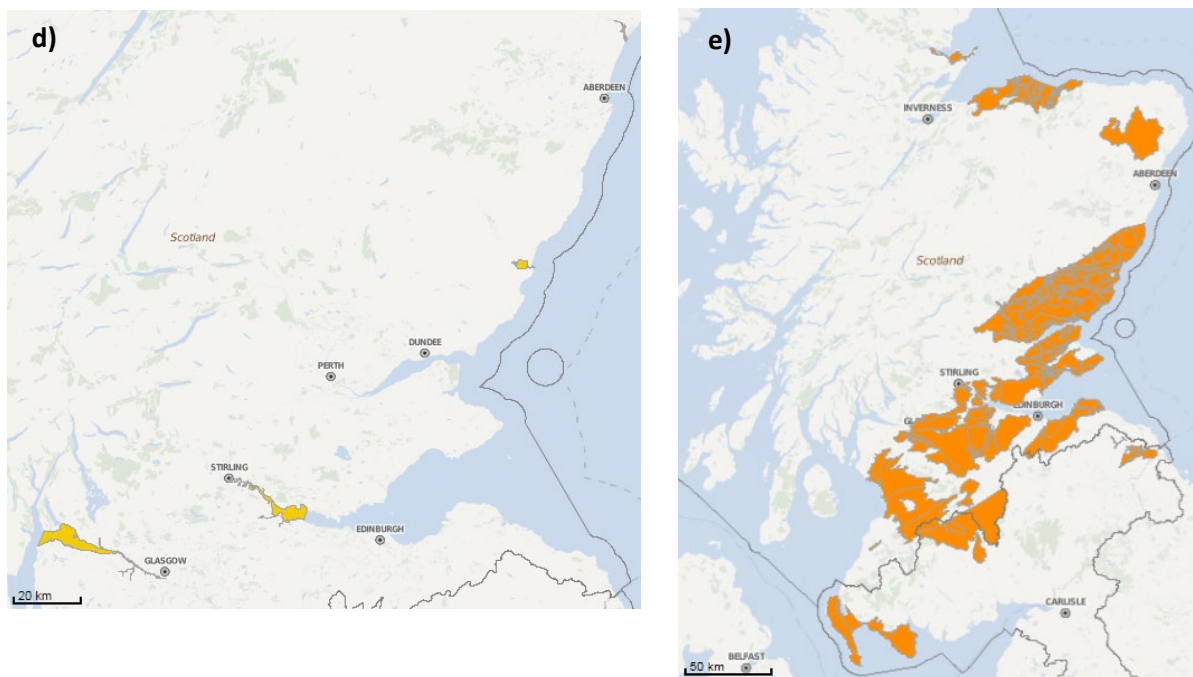


Figure 2 shows the distribution of all water bodies at less than good status. As would be expected, there are concentrations of water bodies in less than good status in the more populated and intensively farmed areas.

During the period 2015-16 the majority of changes were due to improvements in understanding resulting from additional data. However, there were also ‘real’ changes where SEPA are confident that the underlying quality of the environment was altered (SEPA, 2016). These improvements were delivered by removing barriers to fish migrations, and requiring licensed operators to reduce adverse impacts due to discharges of pollutants and water abstraction (SEPA, 2016)

What has happened in the past?

The state of Scotland’s water bodies as a whole has significantly improved over the last few decades (Critchlow-Watton, 2014). In particular there has been significant progress in preventing and reducing pollution e.g. between 2000 and 2006 (pre-WFD), the length of rivers in Scotland that were affected by pollution was reduced by 37% (Scottish Government, 2009).

Over the course of the first River Basin Management Plans, water body types have shown no significant trend in the number of sites failing to meet good status (Table 1). However, changes in the assessment methodology make it difficult to assess the significance of any trend (see ‘Interpretation of indicator trends’ below). Despite these difficulties, there have been real improvements made to the quality of many water bodies, with around 100 already restored to good status by the end of 2013, including around 1,000 km of Scotland’s river network (SEPA, 2014). These improvements were largely secured by requiring licensed operators to reduce impacts arising from discharges of pollutants or water abstractions, as well as by working with organisations such as the Rivers & Fisheries Trusts for Scotland, to remove barriers to fish migration (SEPA, 2014).

Table 1 Proportion of waterbody sites not meeting Good Overall Status (2008-2016). Figures are presented for all of Scotland (Scotland and Solway river basin districts combined)

Proportion* of sites <u>not</u> meeting Good Overall Status (%)	2008	2009	2010	2011	2012	2013	2014	2015	2016
Rivers	46	46	46	46	44	45	46	45	46
Lochs	37	37	37	38	37	33	34	37	36
Estuaries	15	17	15	15	15	13	15	15	15
Coastal	7	5	4	4	3	5	3	7	0
Groundwater					24	22	22	21	21

*Proportion is based on numbers of sites not area

What is projected to happen in the future?

River basin management planning in Scotland sets out how improvements to Scotland's water environment will be phased. This phasing has been designed to take account of the time needed to develop and implement technical solutions, and make the required investments and adjustments without creating disproportionate burden (Scottish Government, 2009). The aim is to both protect the status of water bodies currently in good or better status whilst prioritising the restoration of others.

The second RBMPs set out objectives from 2015-2027 and are informed by lessons learnt in the delivery of the first cycle. To achieve these objectives, SEPA aim to work in partnership with other public bodies, industry and land managers. The importance of recognising the impact of climate change on Scotland's water environment is acknowledged in the second RBMPs:

“Climate change will increasingly affect demands on water resources, the ability of the water environment to accommodate water uses, the pattern of land uses and the ability of non-native species to spread and become established” (SEPA 2015)

Many of the water bodies which are currently at high status are in upland areas and they therefore support species which are adapted to colder temperatures which may make these communities less resilient to projected increases in temperature.

Fundamental to the RBMP process is the legislative framework intended to ensure action on the most significant pressures on the water environment, supported by economic incentives and funding and education to promote, encourage and support action. It is also intended that RBMP objectives will align and integrate into both land use planning and flood risk management (SEPA, 2015).

Actions to deliver the objectives of the RBMPs have been set out for 2015-2021 and 2021-2027. The main action areas are³:

- Action to improve water quality- rural diffuse pollution
- Action to improve water quality- waste water discharges
- Action to improve physical condition
- Action to improve access for fish migration
- Actions to improve water flows and levels
- Actions to prevent the spread of invasive non-native species

³ For detail see: <https://www.sepa.org.uk/environment/water/river-basin-management-planning/actions-to-deliver-rbmp/>

Patterns of change

Between 2008 -16, there was not a consistent picture across water bodies in all eleven Area Advisory Groups⁴ (Table A1, Appendix 2).

Rivers

Three areas show a large (over 4 percentage points) increase in the proportion of rivers in good status- Argyll, Solway and North Highland. The greatest improvements over this period were in the Tweed, North East Scotland and Forth areas. Despite this improvement, over three quarters of rivers in the Forth area remain at less than good condition..

Lochs

Three areas show an increase in the proportion of lochs assessed to be in less than good condition- North Highland, Tay and North East Scotland. The rest of the areas all show an overall improvement during this period, though the Solway, Clyde and Forth regions still have the highest proportions of lochs at less than good status.

Estuaries

There has been no overall change in any areas during this period.

Coastal

All but two areas (Forth and Clyde) have had all their coastal waterbodies assessed as at good condition or better in 2016. The greatest improvement over this whole period occurred in the Clyde region which now has only one coastal stretch assessed as less than good. Whilst the Forth region shows a less significant change over this entire period, in 2013 all of this areas coastal water bodies were assessed as less than good, but this has now reduced to just one (or 8.3%).

Interpretation of indicator trends

SEPA has been progressively improving the understanding of the state of the water environment in Scotland, and since 2009 a number of changes have occurred to the way data is collected and analysed:

- increasing the amount of environmental data on which the assessments are based;
- developing and refining the models used to interpret data and make assessments;
- and refining the delineation of bodies of groundwater and surface water to ensure there are not significant differences in environmental quality in different parts of the same water body (SEPA, 2014)

There are therefore some changes within the data over this period that reflect a change in understanding rather than an actual change in the water bodies.

One of the most significant improvements in understanding has been due to a review of the way bodies of groundwater are delineated, resulting in over 3,400 km² of groundwater being upgraded and around 2,250 km² downgraded between 2008 and 2013 (SEPA, 2014).

⁴ 11 multi stakeholder advisory groups are in place to contribute to river basin management plan development and delivery within their areas and contribute their local knowledge to the process

Limitations

All the groundwater bodies were redefined in 2012. No historical data for the current groundwater bodies are available before 2012 and no assessment of the change in classification will be available for these bodies prior to 2013.

Analysis is based on the water bodies ID as defined in 2012.

References

Critchlow-Watton, N., Dobbie, K., Bell, R., et al (eds) (2014). *Scotland's State of the Environment Report, 2014*. Available online at: <http://www.environment.scotland.gov.uk/media/92572/state-of-environment-report-2014.pdf>

Scottish Government (2009) *The river basin management plan for the Scotland river basin district 2009–2015*. Available online at: <http://www.sepa.org.uk/environment/water/river-basin-management-planning/publications#RBMPplan>

Scottish Government (2013) *Improving the physical condition of Scotland's water environment. A supplementary plan for the river basin management plans*. Available online at: <http://www.sepa.org.uk/media/37336/improving-physical-condition-scotlands-water-environment.pdf>

Scottish Government (2014) *Current condition and challenges for the future: Scotland river basin district*. Available online at: <https://consultation.sepa.org.uk/rbmp/cccf-scotland>

SEPA (2014) *State of Scotland's Water Environment 2013: Summary Report*. Available online at: http://www.sepa.org.uk/media/125696/state_of_scotlands_water_environment_2013_summary_report.pdf

SEPA (2015) *The river basin management plan for the Scotland river basin district: 2015-2027*. Available online at: <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf>

SEPA (2016) *State of Scotland's Water Environment 2016: Summary Report*. Available online at: <https://www.sepa.org.uk/media/320703/state-of-scotlands-water-environment-summary-report.pdf>

SEPA (2018) Water Environment Hub. Available online at <http://www.sepa.org.uk/data-visualisation/water-environment-hub/>

Further information

Water body classification:
<http://www.environment.scotland.gov.uk/get-interactive/data/water-body-classification/>
<http://www.gov.scot/Publications/2008/09/04113207/5>

State of Scotland's Water Environment:
<https://www.sepa.org.uk/media/320703/state-of-scotlands-water-environment-summary-report.pdf>

Acknowledgements

David Denoon (SEPA) - supply of water body data and advice regarding interpretation for the original indicator in 2016.

Janine Hensman (SEPA)- review (2016)

Appendix One: Indicator metadata and methodology

Table 1: Indicator metadata

	Metadata
Title of the indicator	NB24 Proportion of water bodies not meeting Good Overall Status
Indicator contact: Organisation or individual/s responsible for the indicator	Anna Moss (CXC, University of Dundee)
Indicator data source	SEPA
Data link: URL for retrieving the indicator primary indicator data.	https://www.sepa.org.uk/data-visualisation/water-classification-hub/

Table 2: Indicator data

	Indicator data
Temporal coverage: Start and end dates, identifying any significant data gaps.	2008-2016
Frequency of updates: Planned or potential updates	Annual
Spatial coverage: Maximum area for which data is available	Scotland
Uncertainties: Uncertainty issues arising from e.g. data collection, aggregation of data, data gaps	All the groundwater bodies were redefined in 2012. No historical data for the current groundwater bodies are available before 2012 and no assessment of the change in classification will be available for these bodies prior to 2013. Analysis is based on the water bodies as defined in 2012.
Spatial resolution: Scale/unit for which data is collected	Individual water body units as defined for data collection for the WFD
Categorical resolution: Potential for disaggregation of data into categories	River, loch, estuary, coastal, groundwater
Data accessibility: Restrictions on usage, relevant terms & conditions	No restrictions

Table 3 Contributing data sources

Contributing data sources
Data sets used to create the indicator data, the organisation responsible for them and any URLs which provide access to the data.

Table 4 Indicator methodology

Indicator methodology
The methodology used to create the indicator data

Appendix Two

Table A1 Proportion of waterbodies within each Area Advisory Group (AAG) at less than Good Overall Status for 2013, and change in proportion (%) since 2008. Coloured cells indicate AAGs where the proportion of water bodies in less than good status has changed by 2% or more during this period: red = increase; green = decrease.

2016	Argyll	Clyde	Forth	North East Scotland	North Highland	Orkney and Shetland	Solway	Tay	Tweed	West Highland
Rivers										
Total no. of waterbodies	249	261	198	275	426	35	224	265	155	284
Proportion < good (%)	37.6	60.7	75.8	54.4	32.6	28.6	64.7	53.8	41.9	11.8
Change in % 2008-16	6.3	-2.9	-5.6	-5.9	4.4	-2.9	6.3	0.2	-9.7	1.2
Lochs										
Total no. of waterbodies	36	27	23	12	80	13	19	28	6	88
Proportion < good (%)	18.9	74.1	60.9	50.0	38.3	15.4	89.5	46.4	16.7	9.1
Change in % 2008-16	-8.9	-14.8	-30.4	8.3	18.3	-7.7	-5.3	10.7	-33.3	-6.8
Estuaries										
Total no. of waterbodies	3	8	6	7	10	N/A	10	4	N/A	N/A
Proportion < good (%)	0.0	25.0	33.3	14.3	0.0	N/A	10.0	25.0	N/A	N/A
Change in % 2008-16	0.0	0.0	0.0	0.0	0.0	N/A	0.0	0.0	N/A	N/A
Coastal										
Total no. of waterbodies	73	22	12	15	24	94	8	6	N/A	203
Proportion < good (%)	0.0	4.5	8.3	0.0	0.0	0.0	0.0	0.0	N/A	0.0
Change in % 2008-16	-17.8	-40.9	-8.3	-6.7	0.0	-3.2	-12.5	0.0	N/A	0.0