AUDITOR-GENERAL'S REPORT
PERFORMANCE AUDIT

Protecting our Rivers

Follow-up of 2003 Performance Audit

The Legislative Assembly
Parliament House
SYDNEY NSW 2000

The Legislative Council
Parliament House
SYDNEY NSW 2000

In accordance with section 38E of the *Public Finance and Audit Act 1983*, I present a report titled **Protecting our Rivers: Follow-up of 2003 Performance Audit.**

Peter Achterstraat
Auditor-General

Sydney
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Foreword

Pollutants reach rivers from many sources. They come from run-off from agricultural land, drainage from irrigations schemes, contamination from industries, sewage overflows, urban stormwater systems and other sources across the catchment.

Polluted water can affect the health of humans and of crops, farm livestock, river plants and animals. For example:

- salt can damage crops, soils, water supply systems and makes water unsuitable to drink
- muddy water can suffocate life in a river, block irrigation sprays and pipes, and also leave water unsuitable to drink
- nutrients, such as phosphorus and nitrogen from agricultural fertilisers, can encourage the growth of blue-green algae, which may cause serious health problems to humans and animals.

There are many other pollutants that affect water quality, including acidic substances, metals, pesticides and other chemical residues.

This audit follows up our 2003 performance audit 'Protecting our rivers' which examined whether the water quality of NSW rivers was being efficiently and effectively protected from unacceptable levels of pollution.

I believe this report will help to inform the public of the complexity and challenges that lie ahead and highlight the importance of systematically monitoring the river health and water quality of New South Wales rivers.

Peter Achterstraat
Auditor-General

May 2008

Executive summary

The focus of our audit

Our 2003 'Protecting our rivers' audit examined whether the water quality of New South Wales rivers was efficiently and effectively protected against unacceptable levels of pollution. In this follow up audit we examined whether there had been progress in addressing the recommendations of our 2003 audit. We also examined whether a monitoring system had been established to measure river health and water quality of NSW rivers.

By the time of our audit in 2003, agencies had been taking action to reduce the quantity of pollutants reaching rivers for more than 20 years. They considered that their actions had been effective. But they could not measure the effectiveness of their actions in every river system, as they had not established a comprehensive monitoring system to measure water quality or river health.

Our 2003 audit found there were significant gaps in the monitoring and evaluation of water quality. It was not possible, using the information available, to gauge the health of all rivers, the main risks to rivers or strategies for managing those risks. We also considered that the existing arrangements for managing water quality lacked the structure to ensure success. There was no lead entity to coordinate efforts to protect river water.

We recommended that the Government establish a lead entity with an appropriate governance structure and resources for implementing the State's objectives for water quality. The lead entity should develop:

- a framework for coordinated management of rivers
- a State river health and water quality strategy including a monitoring system for river water quality
- a plan to limit and reduce pollution in rivers, particularly diffuse source pollution.

We also recommended that the Government establish an independent environmental audit of river water quality.

Audit opinion

At the time of our 2003 audit agencies were unable to measure the water quality in NSW rivers as they had not established a comprehensive and ongoing monitoring system for water quality. Agencies are now developing a monitoring system to measure the progress against the State Plan 2006 target to improve the condition of riverine ecosystems by 2015. It may not be possible to identify an overall trend in the condition of riverine ecosystems by the State Plan target date of 2015. This is because riverine ecosystems do not respond rapidly to change in the environment. A long period of time is required to collect sufficient data to establish a baseline for all indicators being used and to determine trends, particularly given the prolonged drought.

The State Plan 2006 river ecosystems target to improve the condition of riverine ecosystems by 2015 will provide a clearer basis for agency accountability than the previous guidelines on selection of water quality and river flow objectives.

Agencies are now implementing the recommendations of our 2003 audit as part of their program to achieve the State Plan 2006 target for the condition of riverine ecosystems.

The Government has appointed a lead entity, the Natural Resources and Environment CEOs Cluster Group (NR&E CEO Cluster Group) to coordinate achieving the 13 natural resource targets in the State Plan 2006, including the target for the condition of riverine ecosystems. The NR&E CEO Cluster Group is striving to achieve this target. In our view the NR&E CEO Cluster Group lacks the governance structure and resources for the long program required as it has no direct funding and cannot direct agency priorities. However, the agencies advise that the NR&E CEO Cluster Group is responsible to the Premier for achieving the natural resources targets. The CEOs on the NR&E CEO Cluster Group will agree on allocation of tasks to agencies and the individual CEOs can negotiate priorities and budget allocations for their tasks within their own agencies.

The Government responded to our 2003 audit recommendation to establish an independent environmental audit of river water quality. In late 2003 it established the Natural Resources Commission (NRC) to undertake independent audits of natural resources. The NRC is currently required to report against the 13 statewide natural resources targets in the State Plan 2006. The NRC has legislative capacity to undertake audits of other natural resource management plans and issues, as required by the Minister. We believe that the NRC would be an appropriate entity to undertake such reviews.

Key Audit Findings

Chapter 1: Measuring river health and water quality

Can NSW agencies now measure whether there has been an improvement in the river health and water quality of NSW rivers?

Agencies are establishing a monitoring system for the State Plan 2006 target: 'By 2015 there is an improvement in the condition of riverine ecosystems'. This target is a further development from the water quality and river flow objectives that applied at the time of our 2003 audit. The monitoring system will measure trends in the condition of river ecosystems, initially using fish, macroinvertebrates and hydrology indicators. The condition of riverine ecosystems indicates the overall condition and health of the river.

The approach of monitoring the condition of riverine ecosystems to indicate river health was developed for the Murray Darling Basin Commission's Sustainable Rivers Audit of rivers in the Murray Darling Basin, which commenced in 2004.

NSW agencies have implemented the Sustainable Rivers Audit approach within the river valleys of the Murray Darling Basin. They have commenced a program of monitoring the State's coastal rivers using the same methodology. Additional indicators of river health are being developed to add to the Sustainable Rivers Audit approach – riverine vegetation and river physical form. They are also implementing a new water quality monitoring program that will eventually provide a statewide coverage for turbidity, nutrients and salinity.

It is not yet clear how long it will take to demonstrate valid trends in the overall condition of riverine ecosystems. Riverine ecosystems do not respond rapidly to change in the environment and are affected by variability of climate, such as the severe drought since 2001. Agencies expect to take until about 2012 to effectively establish a meaningful baseline for indicators being used for assessing river health, and then further time for monitoring and analysis to establish the trend. Monitoring that is underway is expected to present a snapshot of the current condition of river systems across NSW and for each Catchment Management Authority area by the end of 2008.

Chapter 2: Progress in addressing the recommendations of the 2003 audit

Has there been progress in addressing the recommendations of the 2003 audit?

We made a number of recommendations in our 2003 audit to improve the protection of water quality of NSW rivers. The Government and the agencies are now implementing our 2003 audit recommendations as part of the program to achieve the State Plan 2006 target to improve the condition of riverine ecosystems by 2015.

The 2003 recommendations (in bold) and our findings on the actions being taken to implement them are:

We recommended that the Government establish a lead entity to implement the State's objectives for river health and water quality.

The Department of Environment and Climate Change has overall responsibility for leading the response on Priority E4 of the State Plan 2006 and reporting on progress. Priority E4 contains 13 State Plan natural resource targets, including the target to improve the condition of riverine ecosystems by 2015. The Natural Resources and Environment CEOs Cluster (NR&E CEO Cluster Group) is lead entity/coordinator for all 13 natural resources targets.

and that the lead entity:

- **develop a framework for coordinated management of river health and water quality**

  The Water CEOs Group (now replaced by the NR&E CEO Cluster Group) agreed to a draft framework document that broadly describes the responsibilities of agencies involved in managing river health and water quality.

- **develop a strategy to define the role of the water quality objectives, call for a formal risk assessment of rivers and strengthen systems for water quality monitoring**
  - the State Plan 2006 target includes a target for the condition of riverine ecosystems and guidelines have been issued to define the role of the water quality objectives
  - no formal risk assessment of NSW rivers has been undertaken since 1997
  - the agencies are developing a comprehensive statewide monitoring system for the State Plan 2006 target for river health that they expect to be fully operational in 2008-09. Valid trends may not be evident in all indicators by 2015 – the State Plan 2006 target date to achieve improvement.

- **develop a plan for pollution, particularly diffuse source pollution.**

  The agencies have advised that diffuse source pollution is the main source of pollution to rivers remaining to be addressed. The lead entity has prepared a statewide draft plan to limit and reduce diffuse source pollution from priority sources across NSW catchments as part of the program to achieve the State Plan 2006 target for the condition of riverine ecosystems. This plan will build upon existing programs and will initiate and coordinate new management actions across the State. There has also been significant action to address urban stormwater management.

We also recommended that the Government establish an independent environmental review of river health and water quality.

Our 2003 audit noted that no entity regularly audited river water quality. In late 2003 the Government established the Natural Resources Commission (NRC). The NRC currently audits the effectiveness of the Catchment Management Authorities' implementation of their catchment action plans. It has been tasked with reporting against the 13 statewide natural resources targets in the State Plan 2006. The NRC has legislative capacity to undertake audits of other natural resource management plans and issues, as required by the Minister. We believe that the NRC would be an appropriate entity to undertake such reviews.

Response from the Department of Environment and Climate Change

Thank you for the opportunity to provide a formal response to the Follow up of the 2003 Performance Audit 'Protecting our rivers'.

As you would be aware the Department of Environment and Climate Change (DECC) has worked closely with the Auditor-General's Office as they prepared this report. We believe the report is now a fair and reasonable account of the general issues involved in managing and monitoring river health and water quality in NSW.

However, it has been difficult to reflect the full extent of the governance changes and technical challenges faced by Government agencies since the 2003 Audit. Soon after the 2003 Audit the Government introduced substantial reforms to natural resource management in NSW, which included the establishment of the Natural Resources Commission (NRC) and the establishment of Catchment Management Authorities (CMAs). The NRC was charged with developing standards and targets for natural resources management (including the target for riverine health) for Government's consideration and auditing the Catchment Action Plans developed by the CMAs. Considerable effort (time and resources) by relevant Departments went into assisting the NRC develop the statewide standard and targets throughout 2004-05.

Following this stage there was an intensive effort from relevant agencies to develop a NSW Natural Resources Monitoring, Evaluation and Reporting Strategy to support the implementation of the natural resource standard and targets for both agencies and CMAs. The strategy represents the first time that such a comprehensive, statewide monitoring strategy has been developed across all natural resource agencies and put in place. This is the result of some three years of work undertaken by several departments with the NRC to develop the strategy, through the early developmental stages, consultation and refinement of methodologies and analytical methods. Implementation of the strategy will involve a massive amount of data collection and analysis by the participating agencies for years to come.

The Audit report correctly points out that some of the indicators and measures adopted in the monitoring strategy will take some years to develop an adequate data base to be able to understand the baseline condition and then some further time to get a meaningful picture of trends. In the case of the riverine health target the Government is better placed than for some other targets as it put in place community agreed water quality objectives for each river valley in 1998. These objectives provide a benchmark for measurement of river condition against desired environmental values and these can be measured in a quantitative sense through the application of the ANZECC/ARMCANZ Guidelines for Fresh and Marine Water Quality published in 2000. The roll out of the Monitoring and Evaluation Strategy will build on this part of the NSW water reforms and provide a consistent and rigorous monitoring program into the future.

In addition, for the first time the Government will have a NSW Strategy for Diffuse Source Water Pollution which has also involved considerable time and effort to research and develop a methodology for setting priorities and brokering agreed projects and partnerships across agencies, local councils and CMAs. This project should provide a framework for addressing this very complex and widespread problem in a far more focussed and coordinated way than has been attempted in the past.

The Department agrees that an independent environmental review of river health and water quality is desirable, and that the NRC is well placed to do so.

We thank you and your staff for the opportunity to contribute to this follow up Audit, in particular for the time necessary to explain the new arrangements and detailed concepts involved in the management of river health in New South Wales.

(signed)

Lisa Corbyn
Director General

Dated: 29 April 2008

Response from the Department of Water and Energy

I refer to your letter of 1 April 2008 concerning The Audit Office's final report on the follow-up performance audit 'Protecting our Rivers', and I thank you for the opportunity to provide a formal response.

As you know, the Department of Water and Energy (DWE) has devoted a significant amount of time and effort to assist the Auditor-General's Office in preparing this report. We believe the report now reflects much better the current natural resources directions that the Government has implemented in an effort to tackle the complexities of river health and water management, rather than just the water quality component. This has been borne out not only by the Government's decision to establish targets for river health within its State Plan 2006, but also recent Australian Government initiatives within the Murray Darling Basin.

The report appropriately recognises that state agencies and Catchment Management Authorities have made significant progress since the original audit in 2003. The DWE agrees that more needs to be done, in particular to derive the necessary baselines for monitoring and reporting against the state targets, but also to ensure ongoing assessment of our progress towards these targets.

The creation of DWE as a Division of Government in April 2007, places the Department in a position to lend strong and effective support into the future to ensure that sufficient information is available for government to measure its performance against its agreed targets for river health. The DWE is working collaboratively with both the Department of Environment and Climate Change and Department of Primary Industries to ensure this is achieved.

(signed)

Mark Duffy
Director-General

Dated: 29 April 2008

1 Measuring river health and water quality

At a glance

The key question we wanted to answer was:

Can NSW agencies now measure whether there has been an improvement in the river health and water quality of NSW rivers?

Agencies are establishing a monitoring system for the State Plan 2006 target: 'By 2015 there is an improvement in the condition of riverine ecosystems'. This target is a further development from the water quality and river flow objectives that applied at the time of our 2003 audit. The monitoring system will measure trends in the condition of river ecosystems, initially using fish, macroinvertebrates and hydrology indicators. The condition of riverine ecosystems indicates the overall condition and health of the river.

The approach of monitoring the condition of riverine ecosystems to indicate river health was developed for the Murray Darling Basin Commission's Sustainable Rivers Audit of rivers in the Murray Darling Basin, which commenced in 2004. NSW agencies have implemented the Sustainable Rivers Audit approach within the river valleys of the Murray Darling Basin. They have commenced a program of monitoring the State's coastal rivers using the same methodology. Additional indicators of river health are being developed to add to the Sustainable Rivers Audit approach – riverine vegetation and river physical form. They are also implementing a new water quality monitoring program that will eventually provide a statewide coverage for turbidity, nutrients and salinity.

It is not yet clear how long it will take to demonstrate valid trends in the overall condition of riverine ecosystems. Riverine ecosystems do not respond rapidly to change in the environment and are affected by variability of climate, such as the severe drought since 2001. Agencies expect to take until about 2012 to effectively establish a meaningful baseline for indicators being used for assessing river health, and then further time for monitoring and analysis to establish the trend. Monitoring that is underway is expected to present a snapshot of the current condition of river systems across NSW and for each Catchment Management Authority area by the end of 2008.

1.1 Is there a monitoring system for river health and water quality?

Our assessment

Agencies are establishing a monitoring system for the State Plan 2006 target: 'By 2015 there is an improvement in the condition of riverine ecosystems'. This target is a further development from the water quality and river flow objectives that applied at the time of our 2003 audit. The monitoring system will measure trends in the condition of river ecosystems, initially using fish, macroinvertebrates and hydrology indicators. The condition of riverine ecosystems indicates the overall condition and health of the river.

Pollutant discharges reduced

New South Wales agencies began taking action in the 1970s to reduce the amounts of pollutants discharged to rivers. They began by licensing factories and other 'point sources' of pollutants discharging to metropolitan waters then extended their focus to industries across the state. They also introduced programs for reduction of pollution from urban stormwater, for better treatment of urban wastewater and for interception of saline waters.

By 2003

At the time of our 2003 audit, agencies assessed the extent licensing had reduced the pollution reaching rivers by monitoring compliance with licences. They did not have a comprehensive statewide system to monitor water quality of NSW rivers. A statewide water quality system monitoring system had been developed in the 1980s and operated until 2000 but was then discontinued.

At this stage the Government had not established targets for water quality that provided a clear basis for agency accountability. In 1998 the Government had endorsed interim water quality and river flow objectives that had been agreed with communities for 31 NSW rivers. The objectives were supported by detailed technical guidelines. However they were advisory only and meant to provide a framework for assessing the environmental values for rivers sought by the community (Appendix 3).

We made a number of recommendations in our 2003 audit report. The recommendations included that agencies define the role of the water quality objectives and that they develop a monitoring system for river water quality. The purpose of the monitoring system was to provide reliable data to manage and report on the water quality of NSW rivers.

Government established State natural resource targets

The Government in 2003 established the Natural Resources Commission (NRC) as its independent advisor on natural resources. The NRC developed 13 targets for natural resources management. The Government approved the NRC's 13 targets in 2005 and included them in the State Plan 2006.

The Government appointed the Natural Resources and Environment CEOs Cluster Group (NR&E CEO Cluster Group) as lead entity to achieve the State Plan 2006 targets for natural resources. The NR&E CEO Cluster Group developed the NSW Natural Resources Monitoring, Evaluation and Reporting Strategy to monitor and report on progress against the 13 State natural resources targets. The strategy has been agreed by Government and the NR&E CEO Cluster Group is now coordinating implementation. Not all components are yet fully operational, but agencies expect them to be operational by 2009.

The 13 State Plan 2006 natural resource targets include a target for the condition of rivers. The target is: 'By 2015 there is an improvement in the condition of riverine ecosystems'. This target is a further development from the water quality and river flow objectives that applied at the time of our 2003 audit.

While agencies are focussed on achieving the State Plan 2006 riverine ecosystems target and the other natural resource targets, the water quality objectives still have a role. Agencies, catchment management authorities, local government and others use the water quality objectives and their supporting indicators and criteria for regional planning and regulation. Users called for practical assistance to assist them to implement and apply these objectives. The Department of Environment and Climate Change since 2004 has developed and published documents to guide how these objectives could be used with the existing technical guidelines as benchmarks for assessing progress in water quality in NSW rivers (Appendix 3).

The NR&E CEO Cluster Group is coordinating initiatives to achieve the State Plan riverine ecosystems target (Chapter 2). It is also coordinating development of a comprehensive monitoring system for this target as part of its overall natural resource monitoring and reporting strategy. The Department of Environment and Climate Change and the Department of Water and Energy are the key agencies for implementing the monitoring strategy. They have chosen to monitor the condition of riverine ecosystems – initially measured using fish, macroinvertebrates and hydrology – as an indicator of the overall condition and health of a river. This approach was developed for the Murray Darling Basin Commission's Sustainable Rivers Audit. Agencies advise that it represents current best international practice.

There has now been three years of monitoring of the inland rivers and one of coastal rivers using the three initial indicators – fish, macroinvertebrates and hydrology. Agencies also are developing additional indicators – riverine vegetation and river physical form – to assess other elements of river health. The additional indicators will be used in conjunction with the three initial indicators.

Monitoring and reporting progress on the State Plan riverine ecosystems target

Agencies expect to take until about 2012 to complete baselines for all indicators being used and then further time for monitoring and analysis to establish trends. As a result it may not be possible to establish valid trends in all these indicators until the full monitoring system has been operational for several years. This needs to be well before 2015 so that it is possible to measure and report progress against the State Plan 2006 target for riverine ecosystems.

In the next two sections of this chapter we outline the development of the monitoring system for the condition of riverine ecosystems. We particularly discuss two steps in the implementation:

- Section 1.2 examines how targets and indicators have been established for the condition of riverine ecosystems
- Section 1.3 examines the timetable to establish a baseline and trend in the condition of riverine ecosystems.

1.2 Have targets and indicators been established?

Our assessment

The approach of monitoring the condition of riverine ecosystems to indicate river health was developed for the Murray Darling Basin Commission's Sustainable Rivers Audit of rivers in the Murray Darling Basin, which commenced in 2004. NSW agencies have implemented the Sustainable Rivers Audit approach within the river valleys of the Murray Darling Basin. They have commenced a program of monitoring the State's coastal rivers using the same methodology. Additional indicators of river health are being developed to add to the Sustainable Rivers Audit approach – riverine vegetation and river physical form. They are also implementing a new water quality monitoring program that will eventually provide a statewide coverage for turbidity, nutrients and salinity.

River health target in State Plan 2006

In 2006 the Government issued the first NSW State Plan. Priority E4 in the State Plan contains 13 targets for better outcomes for natural resources. The targets had been developed by the Natural Resources Commission (NRC), which in 2003 took over the Healthy Rivers Commission's independent advisory role to the Government.

Natural Resource Target 5 from the State Plan is: 'By 2015 there is an improvement in the condition of riverine ecosystems'.

The Natural Resources Commission selected this target as an indicator of river health based on joint research by the Murray-Darling Basin Commission and NSW, Queensland, Victoria and the ACT, each of which has adopted the same or similar targets.

Murray-Darling Basin Commission research on river health indicators

The Murray-Darling Basin Commission (MDBC) coordinates management of rivers in the Murray-Darling Basin. It works with NSW agencies to manage the Murray and Darling rivers and the NSW inland rivers that flow to the Murray and Darling rivers.

The MDBC's research indicated that water quality indicators were unlikely to be an efficient means of assessing river health in the Murray-Darling Basin. It found that water quality indicators - physical and chemical measures of water quality – are highly variable over time in Australian rivers and have to be monitored frequently. This makes them expensive to monitor.

The MDBC found that riverine ecosystems, which change more slowly over time, would be more cost effective to monitor. It concluded that the condition of ecological indicators such as fish, macroinvertebrates and hydrology, supplemented with some physical and chemical measures such as salinity, would be the best and most cost effective indicators of river health.

This research was developed in a joint program with the States. NSW has also adopted this approach for monitoring NSW coastal rivers.

The Government has established an interdepartmental chief executive's committee, the Natural Resources and Environment CEO Cluster Group (NR&E CEO Cluster Group), to develop initiatives to achieve the state natural resources targets, including the riverine ecosystems target.

The NR&E CEO Cluster Group's initiatives to achieve the riverine ecosystems target include actions to address diffuse source pollution, as recommended in our 2003 audit. It is also undertaking other initiatives that in 2003 were part of the program to address the river flow objectives and outside the scope of the 2003 report. We discuss the range of initiatives being undertaken to improve the condition of riverine ecosystems in Chapter 2.

Many of the initiatives to improve riverine ecosystems will contribute to achieving other natural resources targets. For example, fencing of riverbanks will prevent stock reaching the river edge. This will improve the condition of riverine ecosystems by reducing erosion and the amount of sediment muddying the river. It may also contribute to improving the condition of native vegetation and fauna, two of the 13 natural resources targets.

The NR&E CEO Cluster Group is overseeing development of the monitoring system to identify trends in the condition of riverine ecosystems (NSW Monitoring, Evaluation and Reporting Strategy). The Natural Resources Commission, when it set the riverine ecosystems target, did not fully define how the target would be monitored. At the time the methodology for monitoring of riverine ecosystems was not as well established as the methodology for monitoring water quality. It has been necessary to develop a new methodology, with the participation of the agencies, to measure some aspects of the condition of riverine ecosystems.

The NR&E CEO Cluster Group has adopted the MDBC's approach (based on the Sustainable Rivers Audit) to monitoring the condition of riverine ecosystems. It has assigned the Department of Water and Energy (DWE) as the lead agency to coordinate monitoring for the riverine ecosystems target.

Monitoring in the Murray Darling Basin is further advanced than for coastal rivers due to the MDBC's coordinated Sustainable Rivers Audit in inland systems. This same monitoring methodology has been extended to coastal rivers of NSW and it will be important to develop benchmark data for coastal rivers, as has been done for inland rivers over the past three years.

DWE will lead a multi-agency team including the Department of Environment and Climate Change (DECC) and the Department of Primary Industries (DPI). DWE is already working with the MDBC, DECC and DPI to implement this monitoring program in NSW.

NSW riverine ecosystems indicators

Under the agreed NSW Monitoring, Evaluation and Reporting Strategy the current indicators selected to monitor the condition of NSW riverine ecosystems and agencies responsible for each indicator are:

Indicator of condition of riverine ecosystems	Responsible Agency
Fish assemblages* (fish ecosystems)	DPI
Macroinvertebrate assemblages* (macroinvertebrate ecosystems)	DECC
Salinity	DWE
Temperature	DWE
Turbidity	DWE
Hydrology	DWE
Frog assemblages* (pilot study frog ecosystems)	DWE
Riparian and aquatic vegetation	DWE/DECC
River physical form	DWE

*Assemblages are explained below

The ecological indicators are complex measures. For example, the proposed indicator for fish ecosystems - 'Fish assemblages' - will be determined by monitoring about 13 'metrics' of fish ecosystems. These include 'total number of fish species', 'proportion of fish species that is native', 'proportion of individual fish that is native' and 'proportion of fish biomass that is native'. The indicators for macroinvertebrates ecosystems and riparian and aquatic vegetation are similarly complex.

The reason for the complexity is that ecological indicators have been designed so that an improving trend will indicate improving river health – increasing native flora and fauna, improving water quality and a restoration of a pattern of 'naturalness' in the river's physical characteristics and flows. When the indicators are improving, the river will be trending towards a healthier condition.

1.3 Has a baseline and trend been established?

Our assessment

It is not yet clear how long it will take to demonstrate valid trends in the overall condition of riverine ecosystems. Riverine ecosystems do not respond rapidly to change in the environment and are affected by variability of climate, such as the severe drought since 2001. Agencies expect to take until about 2012 to effectively establish a meaningful baseline for indicators being used for assessing river health, and then further time for monitoring and analysis to establish the trend. Monitoring that is underway is expected to present a snapshot of the current condition of river systems across NSW and for each Catchment Management Authority area by the end of 2008.

Identifying the baseline

The purpose of the monitoring system is to determine whether the agencies' and Catchment Management Authority's initiatives are likely to achieve the State Plan 2006 target to improve the condition of riverine ecosystems by 2015.

Agencies advise that the first step is to establish the baseline for all indicators being used for the condition of riverine ecosystems. The baseline is the agreed existing condition of river ecosystems as measured by one or more indicators at a set date, such as 2006. It is the starting point to measure whether agency and Catchment management Authority's actions to improve river health are improving the condition of riverine ecosystems. A baseline condition will be established for each catchment and at many measuring stations on NSW rivers.

It will take several years to establish baselines for all indicators being used in the river systems in NSW. Measures of the condition of riverine ecosystems – fish, macroinvertebrates and hydrology – respond to both natural (such as climate) changes and manmade changes in riverine conditions. The severe drought since 2001, the most severe in recorded history, has affected riverine ecosystems and they will take some time to recover.

The baseline against which to measure the impact of agency actions will be identified, removing the effects of seasonal, cyclic and other natural change from the data. It will require several years of data at each monitoring station and extensive analysis to identify the baseline for all indicators being used.

Some data already exists on six of the riverine indicators listed in Section 1.2. There is a historical data record of salinity, temperature, turbidity and hydrology. There is also some data on fish assemblages and macroinvertebrates. This data is being analysed, and DWE expects to establish baselines for fish and macroinvertebrates assemblages for the Murray-Darling Basin rivers by 2008 and for other rivers by 2012. DWE is still investigating the monitoring methodology for the riverine vegetation, river physical form and frogs indicators and has not finalised a timetable for implementation.

Firm trends may not be established by 2015

Agencies are taking actions to improve the condition of riverine ecosystems (See Chapter 2). The baseline, when established, will be the starting point to measure whether the agencies' actions are improving the condition of riverine ecosystems and therefore river health.

After the baseline for all indicators being used has been established it will require several more years of data and extensive analysis to identify the trend at each monitoring station. DWE advises that, if the baselines are established by 2010-12 as proposed, it may still be unable to demonstrate valid trends in the condition of riverine ecosystems and in river health by 2015 due to drought and other climatic variability or small natural variations in river health. The State Plan 2006 has set a target to improve the condition of riverine ecosystems by 2015.

Reporting until the monitoring system is operational

The agencies have advised that the Government is expecting progress reports on State Plan riverine ecosystems target well before 2015. Agencies will be reporting data on river condition as it becomes available. New South Wales issues a 'State of the Environment' report every three years. The next report is due in 2009. The agencies will use the best available assessment of river condition to prepare individual State of the Catchment reports by the end of 2008 to inform the 2009 State of the Environment report.

DWE anticipates being able to contribute some information to the State of the Environment Report 2009 from monitoring of riverine ecosystems undertaken to that time. However it will not have established statewide baselines for the condition of all riverine ecosystem indicators by 2009.

Agencies may also report progress of some aspects of their activities in terms of outputs. Catchment Management Authorities already use this form of reporting in their annual reports. Catchment Management Authorities do not have the resources to establish monitoring systems to measure their impacts on the condition of riverine ecosystems or other State Plan natural resource targets. They rely on state agencies developing the monitoring system. In the absence of a monitoring system they report outputs from their activities - the length of river banks fenced in the year, the area of soil protected against erosion and similar measures.

Output measures give some indication of the action that is occurring. However they do no provide an adequate basis to determine whether agencies' actions are effective and achieving the target. This can only be achieved by having a comprehensive, fully operational monitoring system.

2 Progress in addressing the recommendations of the 2003 audit

At a glance

The key question we wanted to answer was:

Has there been progress in addressing the recommendations of the 2003 audit?

We recommended that the Government establish a lead entity to implement the State's objectives for river health and water quality.

The Department of Environment and Climate Change has overall responsibility for leading the response on Priority E4 of the State Plan 2006 and reporting on progress. Priority E4 contains 13 State Plan natural resource targets, including the target to improve the condition of riverine ecosystems by 2015. The Natural Resources and Environment CEOs Cluster (NR&E CEO Cluster Group) is lead entity/coordinator for the riverine ecosystems target.

and that the lead entity:

- **develop a framework for coordinated management of river health and water quality**

  The Water CEOs Group (now replaced by the NR&E CEO Cluster Group) agreed to a draft framework document that broadly describes the responsibilities of agencies involved in managing river health and water quality.

- **develop a strategy to define the role of the water quality objectives, call for a formal risk assessment of rivers and strengthen systems for water quality monitoring**

  - the State Plan 2006 target includes a target for the condition of riverine ecosystems and guidelines have been issued to define the role of the water quality objectives
  - no formal risk assessment of NSW rivers has been undertaken since 1997
  - the agencies are developing a comprehensive statewide monitoring system for the State Plan 2006 target for river health that they expect to be fully operational in 2008/09. Valid trends may not be evident in all indicators by 2015 – the State Plan 2006 target date to achieve improvement.

- **develop a plan for pollution, particularly diffuse source pollution.**

  The agencies have advised that diffuse source pollution is the main source of pollution to rivers remaining to be addressed. The lead entity has prepared a statewide draft plan to limit and reduce diffuse source pollution from priority sources across NSW catchments as part of the program to achieve the State Plan 2006 target for the condition of riverine ecosystems. This plan will build upon existing programs and will initiate and coordinate new management actions across the State. There has also been significant action to address urban stormwater management.

We also recommended that the Government establish an independent environmental review of river health and water quality.

Our 2003 audit noted that no entity regularly audited river water quality. In late 2003 the Government established the Natural Resources Commission (NRC). The NRC currently audits the effectiveness of the Catchment Management Authorities' implementation of their catchment action plans. It has been tasked with reporting against the 13 statewide natural resources targets in the State Plan 2006. The NRC has legislative capacity to undertake audits of other natural resource management plans and issues, as required by the Minister. We believe that the NRC would be an appropriate entity to undertake such reviews.

We made a number of recommendations in our 2003 audit. Most of these recommendations are currently being implemented.

When, in a follow up audit, we find that recommendations have not been fully implemented we examine the likely timetable to complete implementing the recommendations and to achieve an improvement in outcomes.

As discussed in Chapter 1, the Government, in the State Plan 2006, changed the target for managing the condition of rivers. The change in target could have made some of our 2003 recommendations irrelevant. However the agencies have found many remain relevant and are implementing them as part of the program to achieve the State Plan 2006 target to improve the condition of riverine ecosystems by 2015.

In this chapter we examine the current and proposed implementation of the 2003 audit recommendations.

2.1 Has a lead entity been established?

Our assessment

The Department of Environment and Climate Change has overall responsibility for leading the response on Priority E4 of the State Plan 2006 and reporting on progress. Priority E4 contains 13 State Plan natural resource targets, including the target to improve the condition of riverine ecosystems by 2015. The Natural Resources and Environment CEOs Cluster (NR&E CEO Cluster Group) is lead entity/coordinator for the riverine ecosystems target.

Our 2003 Recommendation was that:

The Government establish a lead entity with an appropriate governance structure and resources for implementing the State's objectives for river health and water quality.

Structure to ensure success

The 2003 audit found there was no lead entity to coordinate efforts to protect the quality of river water and responsibility was not clearly delineated. It recommended that the Government appoint a lead entity to improve water quality because it found that arrangements at the time lacked the structure to ensure success.

The Government, in 2003, was restructuring its portfolios and agencies for water and natural resources and did not appoint a lead entity.

CEO Cluster Group to coordinate

The Government issued the NSW State Plan in 2006. Priority E4 of the Plan contains 13 State Plan natural resource targets, including the target to improve the condition of riverine ecosystems by 2015. The Department of Environment and Climate Change has overall responsibility for leading the response on Priority E4 and reporting on progress. The Natural Resources and Environment CEOs Cluster (NR&E CEO Cluster Group) is lead entity/coordinator for the riverine ecosystems target. The Director-General of the Department of Environment and Climate Change is chair of the NR&E CEO Cluster Group and members are the CEOs of agencies with a role in natural resources management.

The agencies have advised that that NR&E CEO Cluster Group was appointed lead entity because there was no one agency in government that could effectively account for all the management responsibilities and contributing factors for managing water quality and river health in NSW.

The NR&E CEO Cluster Group has begun working with agencies to achieve the State Plan 2006 natural resources targets. The NR&E CEO Cluster Group relies on agencies contributing resources and funding to achieve the State Plan 2006 natural resources targets. Although the NR&E CEO Cluster Group has no significant direct funding, CEOs can direct their own agency funding and priorities. The Premier can also direct priorities.

2.2 Is there a framework for coordinated management?

Our assessment

The Water CEOs Group (now replaced by the NR&E CEO Cluster Group) agreed to a draft framework document that broadly describes the responsibilities of agencies involved in managing river health and water quality.

Our 2003 Recommendation was that:

The lead entity develop a framework for the coordinated management of rivers with those persons, bodies, agencies or organisations with responsibility for protecting rivers.

Framework to coordinate

The agencies agreed in 2005 that the Water CEOs Cluster Group, a committee of CEOs with responsibilities for managing the state's water resources, would continue as the lead entity to address river health and water quality.

The Water CEOs Group in 2006 issued a draft framework document that broadly described the responsibilities of agencies involved in managing water quality and river health. The draft framework lists 15 parties with responsibilities for water quality and river health, including state agencies, catchment management authorities and local government. There is little detail in this document on how they will work together.

The NR&E CEO Cluster Group has now replaced the Water CEOs Group as the lead entity. It has not yet updated the draft framework issued by the Water CEOs in 2006 but has begun coordinating agencies to achieve the State Plan 2006 natural resources targets.

We examined NR&E CEO Cluster Group agendas, minutes and working papers. We found that the NR&E CEO Cluster Group had:

- established a secretariat
- established a regular two monthly program of meetings of member CEOs
- established projects to achieve the 13 targets for State Plan Priority E4 for natural resources
- assigned teams to implement the approved projects
- established a documented reporting system to the CEO members summarising the progress on the current milestones of each approved project.

Action is still at an early stage. Agencies have advised that a strategy to achieve the natural resources targets is currently before the Government.

Framework at catchment level

While the NR&E CEO Cluster Group is establishing responsibilities at state level, the allocation of responsibilities in each river catchment is unclear. Each river catchment is different and requires different management priorities. NSW had established Catchment Management Authorities (CMAs) for the major catchments across the State. The CMAs were intended to be the catchment scale managers for riverine health in individual catchments. Therefore each Catchment Action Plan and Investment Strategy has this responsibility.

Establishment of Catchment Management Authorities
The New South Wales Government in late 2004 established 13 Catchment Management Authorities (CMAs) across the State. Each CMA has a chairman and board members with relevant expertise. Each board reports directly to the Minister of Climate Change and the Environment. CMAs were established to ensure that regional communities have a significant say in how natural resources are managed in their catchment. Other agencies undertake separate natural resource programs in catchments and maintain their own regional offices. CMAs have funding from the NSW and Commonwealth Governments to assist land managers to improve and restore the natural resources of the state. Each CMA has prepared a Catchment Action Plan setting out the ten year direction and projects for its catchment or catchments.

CMAs report directly to the Minister. They are not currently represented on the NR&E CEO Cluster Group.

While the CMAs have established Catchment Action Plans for the major NSW catchments, these are not plans for integrated management of natural resources in the catchments. Agencies are separately taking many initiatives in catchments that are not included in the CMA's Catchment Action Plans.

Agencies have advised that they have ongoing relations with CMAs and also with local government councils and there is frequently close interaction at regional level. Some parts of agency programs are managed and delivered by CMAs. The Director General of the Department of Environment and Climate Change (DECC), who is also the Chair of the NR&E CEO Cluster Group, wrote to CMA officers in June 2007. The Director-General recognised that CMAs were independent bodies and outlined how DECC would provide administrative support for the work of the CMAs across the state.

2.3 Is there a strategy with targets, risk assessment and monitoring?

Our assessment

- the State Plan 2006 target includes a target for the condition of riverine ecosystems and guidelines have been issued to define the role of the water quality objectives
- no formal risk assessment of NSW rivers has been undertaken
- the agencies are developing a comprehensive statewide monitoring system for the State Plan 2006 target for river health that they expect to be fully operational in 2008/09. Valid trends may not be evident in all indicators by 2015 – the State Plan 2006 target date to achieve improvement.

Our 2003 Recommendation was that:

The lead entity develop a state river and water quality strategy that:

- clearly defines the role of water quality objectives
- includes risk assessment of NSW rivers
- strengthen systems for water quality monitoring, tracking, analysis and reporting.

Defining the objectives

The 2003 audit recommended that the lead entity clearly define the role of the water quality objectives because those objectives were advisory only (Appendix 3). They did not provide a clear basis for planning or regulating river water quality.

The Government has now issued the State Plan 2006 target to improve the condition of riverine ecosystems by 2015. This target is not advisory. It provides a clearer basis for agency accountability for the management of the conditions of rivers than the previous advisory water quality and river flow objectives.

The lead entity, NR&E CEO Cluster Group, has not yet developed an integrated strategy to address the riverine ecosystems target. It has begun developing some of the components of the strategy including a monitoring system and a strategy to address diffuse source pollution.

Risk assessment

Agencies have not at this stage issued a recent risk assessment for NSW rivers. In 1997 the Government issued '*A stressed rivers approach to the management of water use in unregulated streams'* (DLWC 1997). This paper provided a framework to investigate ways of addressing the problems on stressed unregulated rivers. The framework developed a methodology for identifying those rivers at most risk and in need of priority action for water management. This framework was applied statewide to inform the priorities for Council of Australian Government's (COAG) water reform in NSW.

A more contemporary risk assessment would provide the basis to establish priorities for investigation and expenditure to achieve the State Plan riverine ecosystems target for NSW rivers. Agencies have published substantial information on the health of NSW rivers in the NSW State of the Environment reports and hold extensive additional information. This information would provide the basis for a risk assessment.

Monitoring outcomes

The 2003 audit found that there were significant gaps in the monitoring and evaluation of water quality in rivers. The Sustainable Rivers Audit was undertaking limited data collection and analysis that fed into management decisions, and this has been expanded. In line with the change in state target, NR&E CEO Cluster Group is establishing a monitoring system to measure trends in the condition of riverine ecosystems.

The monitoring system being implemented will only monitor the condition of the ecological systems in the river channel. It will not extend to the ecological systems of occasionally flooded parts of the flood plains to provide a full picture of the riverine ecology. Teams monitoring other State Plan natural resource targets, particularly the teams monitoring the wetlands and estuaries targets, may monitor some aspects of the flood plains ecologies. The NR&E CEO Cluster Group has established a unit to integrate monitoring of the State Plan 2006 natural resources targets.

The complete monitoring system for riverine ecosystems is not yet fully operational. When in place it will take time for trends in riverine ecosystems to become apparent as riverine ecosystems do not respond rapidly to changes in river conditions. The monitoring system may not display trends by 2015 – the State Plan 2006 target date to achieve improvement in riverine ecosystems. This problem is discussed in detail in Chapter 1 above.

2.4 Is there a comprehensive plan to reduce pollution?

Our assessment

The agencies have advised that diffuse source pollution is the main source of pollution to rivers remaining to be addressed. The lead entity has prepared a statewide draft plan to limit and reduce diffuse source pollution from priority sources across NSW catchments as part of the program to achieve the State Plan 2006 target for the condition of riverine ecosystems. This plan will build upon existing programs and will initiate and coordinate new management actions across the State. There has also been significant action to address urban stormwater management.

Our 2003 Recommendation was that:

The lead entity develops a comprehensive plan to limit and reduce pollutant levels, particularly diffuse source pollution.

Diffuse source pollution

Our 2003 audit recommended addressing diffuse source pollution as it was the major remaining source of pollutants to rivers. Diffuse source pollution is still the major contributor of pollutants to rivers. The pollutants have many impacts. For example:

- salt damages crops, soils, water supply systems and makes water unsuitable to drink
- turbidity can suffocate life in a river, block irrigation sprays and pipes and also leave water unsuitable to drink
- nutrients such as phosphorus and nitrogen, which come from sewage waste, agricultural activities and detergents, fertilise the growth of blue-green algae that leads to serious risks to stock and drinking water.

There are many other pollutants that affect water quality, including acidic substances, metals, pesticides and other chemical residues (See Appendix 4). The pollutants may come from run-off from agricultural land, drainage from irrigations schemes, contamination from industries, sewage overflows to stormwater systems and other sources.

Reducing diffuse source pollution to rivers will improve river water quality and therefore will contribute to improving the condition of riverine ecosystems.

Most diffuse source pollution is caused by rural land practice. Once pollutants enter waterways they are very difficult to remove or control. Managing diffuse source pollution requires improving land management practice on many properties in a catchment, and managing urban stormwater.

Agencies, including catchment management authorities, have taken diverse actions to reduce diffuse source pollution in catchments. The actions taken include fencing stock from rivers to reduce turbidity, stopping fertilisers washing to rivers to reduce algal growth and limiting pesticide use to protect river life. There have been many other initiatives.

Strategy for diffuse source pollution

Now a draft integrated strategy to address diffuse source pollution has been developed. The NR&E CEO Cluster Group and agencies approved a draft diffuse source water pollution strategy in November 2007. The purpose of the strategy is to provide a state wide framework to coordinate and guide action by agencies, councils and Catchment Management Authorities on diffuse source pollution.

This draft strategy will require working with numerous land owners, councils and Catchment Management Authorities to change land use across each catchment.

The draft strategy notes that licensing was successful in reducing pollution from large point source emitters of pollution. However licensing or other regulation is less likely to be successful when there are hundreds or thousands of properties in a catchment, each possibly a small source of several pollutants. Each landowner needs to be convinced to take action.

There needs to be programs to inform landowners of better land practice to reduce the pollutants. There may be incentives offered to the landowner to address particular pollutants. The mix of initiatives will vary from the catchment to catchment, depending on local conditions.

The Department of Environment and Climate Change has discussed the draft strategy with local government councils, catchment management authorities, agencies, peak industry, environmental groups and other stakeholders. It is planned to have a final strategy in place by June 2008. The strategy provides initial priorities and the basis for negotiating agreed priority action plans. There will be yearly reporting against these plans and three-yearly review of the strategy.

Agencies need to fund their work on diffuse source pollution initiatives from their own funds or from sources such as the Commonwealth's Natural Heritage fund. The NR&E CEO Cluster Group and agencies were unable at present to provide an estimate of the extent the strategy will contribute to improving the condition of riverine ecosystems by 2015.

River flow initiatives

The NR&E CEO Cluster Group is also implementing other initiatives to improve the condition of riverine ecosystems. They include:

- implementing new water management rules in most of the major inland regulated rivers including permanent water licences and allocation of a proportion of flows to the environment
- constructing fish ladders around weirs
- mitigating the impact of cold water from water storages.

These initiatives improve the condition of riverine ecosystems by returning river flow conditions more towards their condition before man-made changes to the river.

These and other initiatives to improve river flow were outside the scope of the 2003 audit as they did not address water quality. However they are an integral part of the program to achieve the State Plan 2006 river ecosystem target.

Because this audit is a follow up of the 2003 audit on water quality, we have not examined the implementation of the actions that were underway or proposed to address the river flow objectives. Therefore we have not made an assessment of their current status or the extent they will contribute to the overall program to address the State Plan 2006 riverine ecosystems target.

2.5 Has an independent environmental audit been established?

Our assessment

Our 2003 audit noted that no entity regularly audited river water quality. In late 2003 the Government established the Natural Resources Commission (NRC). The NRC currently audits the effectiveness of the Catchment Management Authorities' implementation of their catchment action plans. It has been tasked with reporting against the 13 statewide natural resources targets in the State Plan 2006. The NRC has legislative capacity to undertake audits of other natural resource management plans and issues, as required by the Minister. We believe that the NRC would be an appropriate entity to undertake such reviews.

Our 2003 Recommendation was:

The Government establish an independent environmental audit of river water quality.

Many agencies, complex program, long timetable

The program to improve riverine ecosystems is complex, with many agencies involved, many facets of catchment and river management to address and a very long timetable. Given these complexities and the problems of managing funding and accountability discussed above, it is important that there be a regular independent review or audit of the program to achieve this target.

The Natural Resources Commission (NRC) is the appropriate entity to undertake the audit. The NRC's defined functions include 'to audit statewide outcomes and the effectiveness of catchment plan implementation as it considers appropriate or as required'.

The NRC:

- proposed the 13 natural resources targets in the State Plan 2006 to the Government
- currently audits the effectiveness of the Catchment Management Authorities' implementation of their catchment action plans
- is tasked in the State Plan 2006 with reporting against the 13 statewide natural resources standards and targets.

The NRC's audit of Catchment Management Authorities' catchment action plans can include projects by other agencies that are included in the catchment management plans. The NRC's reporting against the 13 statewide natural resources targets in the State Plan 2006 includes impacts of actions by both Catchment Management Authorities and agencies. The NRC has legislative capacity to undertake audits of other natural resource management plans and issues, as required by the Minister. We believe that the NRC would be an appropriate entity to undertake such reviews.

Appendices

Appendix 1 About the audit

Audit objective

The objective of this audit was to examine whether the agencies have addressed the recommendations of the 2003 audit and the changes in river health and water quality since the audit.

Lines of inquiry

1. **Has there been improvement in the river health and water quality of NSW rivers?**

2. **Has there been progress in implementing the recommendations of the 2003 audit report?**

Audit criteria

In answering the lines of inquiry, we used the following audit criteria (the 'what should be') to judge performance. We based these standards on our research of current thinking and guidance on better practice. They have been discussed, and wherever possible, agreed with those we are auditing.

For line of inquiry 1, we asked:

- has the water quality of nsw rivers improved since the 2003 audit?
- have river health and water quality objectives, indicators and target numerical criteria been established for each river in the nsw catchments?
- has a baseline river health and water quality been established for each river as a basis for monitoring future trends?

For line of inquiry 2, we assessed the extent that each recommendation of the 2003 audit report had been implemented.

Audit scope

The audit was a follow up of the 2003 performance audit on protecting our rivers. It focussed on the extent the agencies had implemented our 2003 recommendations, the extent of change from implementing the recommendations and the progress in achieving the new state target for riverine ecosystems issued in the State Plan 2006.

The audit did not seek to:

- examine the agencies' performance to date implementing actions that in 2003 were being undertaken to achieve river flow objectives but are now seen as contributing to improving the condition of riverine ecosystems and the health of NSW rivers
- assess the likelihood of achieving the State Plan 2006 of improving riverine ecosystems by 2015.

However we have provided some information on the range of initiatives the agencies are undertaking to achieve the riverine ecosystems target.

Audit approach

We acquired subject matter expertise by:

- interviewing staff and examining relevant documents including the State Plan 2006, reports, proposals, agendas and minutes relating to the river health and water quality
- interviewing key stakeholder representatives
- drawing comparisons where appropriate with other states and countries.

Audit selection

We use a strategic approach to selecting performance audits which balances our performance audit program to reflect issues of interest to Parliament and the community. Details of our approach to selecting topics and our forward program are available on our website.

Audit methodology

Our performance audit methodology is designed to satisfy Australian Audit Standards AUS 806 and 808 on performance auditing, and to reflect current thinking on performance auditing practices. We produce our audits under a quality management system certified to International Standard ISO 9001. Our processes have also been designed to comply with the auditing requirements specified in the *Public Finance and Audit Act 1983*.

Acknowledgements

We gratefully acknowledge the co-operation and assistance provided by the Department of Environment and Climate Change, the Department of Water and Energy, the Natural Resources Commission and Catchment Management Authorities. In particular, we wish to thank our liaison officers and staff who participated in interviews, assisted with document review or provided other material relevant to the audit.

We were also assisted by discussions with a number of external bodies including the Nature Conservation Council of NSW and several other non-government organisations who contributed to a paper submitted by the Nature Conservation Council.

Audit team

Our team leader for this performance audit was Chris Yates, who was assisted by Neville Johnson. Sean Crumlin provided direction and quality assurance.

Cost

Including staff costs, printing costs and overheads the estimated cost of the audit is $182,000.

Appendix 2 Chronology of events

Date	Action
1970s	NSW began action to improve water quality in the 1970s by licensing dischargers of large amounts of pollutants to the Parramatta, Georges and Cooks Rivers. The licenses limited the amount of pollutant that could be discharged and significantly reduced pollutant levels in the rivers.
1980 1990s	NSW licensed industries and sewage treatment works across the state and introduced a program to reduce the debris and pollutants from urban stormwater entering rivers.
1991	*Protection of the Environment Administration Act 1991*.
1996	Government established the Healthy Rivers Commission (HRC) to provide independent strategic advice about river health goals and the strategies necessary to achieve them.
1997	*Protection of the Environment Operations Act 1997*.
2000	*Water Management Act 2000* established a new framework for the management of the state's water resources. ▪ Water sharing plans ▪ Defined access rights separate from land rights ▪ An access rights register.
2002	HRC audited outcomes of its 1996 Inquiry into the Williams River and found achievements much less than targets/ expectations.
2003	Performance Audit Report 'Protecting our rivers' tabled in parliament.
2003	Agency Reorganisation – Department of Land and Water Conservation disbanded. Department of Infrastructure, Planning and Natural Resources (DIPNR) and Department of Environment and Conservation (DEC) formed.
2003	First meeting of Natural Resources and Environment CEOs Cluster Group (NR&E CEO Cluster Group).
2003	Final report of Healthy Rivers Commission 'Healthy Rivers for Tomorrow' issued.
2003	Natural Resources Commission (NRC) established to provide the Government with independent advice on a range of natural resource issues.
2003	13 Catchment Management Authorities established. Their role included developing catchment management plans for catchments in NSW.
2004	Amendments to *Water Management Act 2000* came into effect incorporating changes to fit with Commonwealth's National Water Initiative: ▪ Perpetual water access licences based on shares of the available resource ▪ A clear and transparent process for allocation of water between consumptive use and the environment.

Date	Action
2004	The Director General of the Department of Infrastructure Planning and Natural Resources wrote to Assistant Auditor General on proposals to address 2003 audit recommendations.
2005	The NRC made recommendations to the Government on statewide standards and targets for natural resources.
2005	Water CEOs agreed to a 'Water Quality and River Health Framework' that specified that the Water CEOs (Chaired by DEC) would take the lead entity role for water quality.
2005	DIPNR disbanded. Department of Natural Resources created.
2006	NSW Natural Resources monitoring, evaluation and reporting strategy issued by NR&E CEO Cluster Group. Approved by Cabinet 7 August 2006.
2006	'Draft water quality and river health framework' issued by Water CEOs updated November 2006. Further updates to be by NR&E CEO Cluster Group.
2006	Government issued State Plan 2006. Priority E4 contains 13 targets for natural resource management based on the NRC's recommendations. Natural Resources Target 5 is 'By 2015 there is an improvement in the condition of riverine ecosystems'.
2007	Department of Water and Energy (DWE) established. Includes responsibilities from Department of Natural Resources.
2007	Department of Environment and Climate Change (DECC) created from the Department of Environment and Conservation (DEC) with some responsibilities from Department of Natural Resources.
2007	Department of Natural Resources disbanded. Most parts to DWE with some parts to DECC and western lands to Department of Lands.
2007	Letters to Minister of Minister for Climate Change, Environment and Water and to CEOs of DECC and DWE advising of follow up audit of 2003 'Protecting our rivers' performance audit.
2007	'Draft NSW 'Diffuse Source Water Pollution Strategy' approved by NR&E CEO Cluster Group and issued. Target is to have final strategy in place by June 2008.

Appendix 3 NSW Water Quality and River Flow Objectives

Water quality

At the time of our 2003 audit, New South Wales had issued 'NSW Water Quality and River Flow Objectives'. This contained interim water quality and river flow objectives for 35 major NSW rivers. The objectives represented 'environmental values that the community believed important'. 'NSW Water Quality and River Flow Objectives' listed several water quality objectives for each of the 35 rivers.

For example, typical objectives for water quality of a major regulated river would include protection of:

- aquatic systems
- visual amenity
- secondary contact recreation (boating)
- primary contact recreation (swimming)
- water supply of livestock
- water supply of homesteads.

Sometimes there were different objectives for different sections of the river.

Agencies advise that the objectives and environmental values were assessed using extremely rigorous scientific information contained in the 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)'.

Each objective had a number of indicators and criteria, For example, one of the objectives 'Protection of aquatic ecosystems' applied to all natural waterways. The indicators for this objective included total phosphorus, total nitrogen, salinity and other physical and chemical parameters. The recommended criteria for total phosphorus in a major regulated river were 20 micrograms per litre in upland rivers, 25 micrograms per litre in lowland rivers flowing to the coast and 50 micrograms per litre for rivers in the Murray/Darling basin. The objectives, indicators and criteria were supported by detailed technical guidelines known as ANZECC 2000 Guidelines for Freshwater and Marine Water Quality.

But these water quality criteria were not regulatory criteria that must not be exceeded. They were advisory medium to long term goals to be progressed towards over time and were therefore advisory in nature. Agencies, catchment management authorities, local government and others involved in river management could vary the recommended indicators and criteria for a particular section of river, depending on their assessment of local conditions. The water quality objectives, indicators and criteria provided a good basis for state-wide assessment and reporting on the water quality of NSW rivers but did not provide as clear basis for agency accountability as the State Plan 2006 natural resources targets.

River flow

There were also river flow objectives for each river or part of a river.

Typical river flow objectives for a NSW river were:

- maintain wetland and floodplain inundation
- maintain natural flow variability
- manage groundwater for ecosystems
- minimise effects of weirs and other structures.

Agencies in 2003 were developing initiatives to achieve the river flow objectives, They were changing the timing of releases from dams and weirs to better match natural seasonal cycles and assigning a part of river flow as 'environmental flows' – flows reserved for supporting the environment and not available for irrigation.

We did not discuss these initiatives in our 2003 audit as we only addressed whether the water quality of NSW rivers was protected against unacceptable levels of pollution. Actions to address the river flow objectives were outside the scope of the audit. However we noted in our 2003 audit that water quality was only part of river management and that river flows significantly affected river condition.

River ecosystems target has replaced water quality

During the 2003 audit agencies indicated that they expected the focus of river management to change from the water quality and river flow objectives to 'river health' – the ecological condition of the river including the different plants, animals and micro-organisms and the ecosystems they form'.

At that time there was no clear, agreed definition of what constituted river health and it was not referred to in NSW legislation.

This has changed with the Government issue of the State Plan 2006 with the target for the condition of riverine ecosystems. The condition of riverine ecosystems is an indicator of river health. The State Plan 2006 river ecosystems target has replaced the interim water quality and river flow objectives that applied in 2003 as the focus of river management in NSW. Agencies are now developing initiatives to achieve the river ecosystems target and improve river health. Many of the initiatives are similar to those previously taken or proposed to achieve the water quality and river flow objectives.

The water quality objectives have a continuing role in local and regional planning and regulation. DECC published a number of guidelines from 2004 defining the role of water quality objectives in managing river health.

Publications defining the role of water quality objectives in managing river health

ANZECC (2000). *Guidelines for Fresh and Marine Water Quality* (http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality)

Department of Environment and Conservation (2004). *Investing in our catchments – Water quality and its role in river health*. http://www.environment.nsw.gov.au/water/catchmentwq.htm

Department of Environment and Conservation (2006). *Considering Environmental Values of Water when Issuing Prevention Notices*. http://www.environment.nsw.gov.au/mao/envwater.htm

Department of Environment and Conservation (2006). *Local planning for healthy waterways using the NSW Water Quality Objectives*. http://www.environment.nsw.gov.au/water/planningusingwqos.htm

Department of Environment and Conservation (2006). *Using the ANZECC Guidelines and Water Quality Objectives in NSW*. http://www.environment.nsw.gov.au/water/usinganzeccandwqos.htm

Appendix 4 Common Water Quality Issues

Environmental value	Common water quality issues	Common pollutants
Aquatic Ecosystems	Stress/death of fish	Low dissolved oxygen, toxicity (algal blooms or chemical contamination), pH, salinity, habitat modification, flow alteration and temperature.
	Loss of diversity of aquatic animals	Chemical contamination, altered habitat conditions (sediment, algal blooms), acidic waters, increased salinity, heavy metal contamination, dissolved oxygen levels, flow alteration and temperature
	Loss of seagrasses	Nutrients and turbidity
	Smothering of aquatic fauna	Suspended sediment
	Loss of spawning trigger for fish	Flow alteration and temperature
	Loss of aquatic plants	Acidic waters
Drinking Water	Taste and odour problems from algal blooms and suspended sediment	Nutrients, sediment and salinity
	Human health problems and scares	Toxins from algal blooms, chemical contamination, viruses, faecal and other micro-organisms
	Reduced treatment and disinfection capability	Nutrients and suspended sediment
Primary Industries (irrigation, stock, aquaculture, human consumption of aquatic foods)	Water unsuitable for consumption by stock	Toxins, suspended sediment and salinity
	Contaminated foods (such as mussels, oysters)	Heavy metals, chemical contamination, viruses, faecal coliforms and other micro-organisms
	Fouled pumps and corroded pipes	Suspended sediment, pH, and salinity
	Water unsuitable for irrigation	Salinity
Recreation and Aesthetics	Smell and odour problems	Nutrients and sediment
	Beach closures (health risks)	Viruses, faecal coliforms and other micro-organisms
	Nuisance growth of aquatic plants, scums, toxic blue greens	Nutrients, turbidity, light and temperature
Industrial	Blockage of intake screens from algal or plant growth	Nutrients and light
	Equipment fouling, corroding pipes	Suspended sediment, pH and salinity
Cultural and Spiritual	Dependent on the particular cultural and spiritual use/value	Dependent on the particular cultural and spiritual use/value

Performance Audits by the Audit Office of New South Wales

Performance Auditing

What are performance audits?

Performance audits determine whether an agency is carrying out its activities effectively, and doing so economically and efficiently and in compliance with all relevant laws.

Performance audits may review a government program, all or part of a government agency or consider particular issues which affect the whole public sector.

Where appropriate, performance audits make recommendations for improvements.

If you wish to find out what performance audits are currently in progress, visit our website at www.audit.nsw.gov.au.

Why do we conduct performance audits?

Performance audits provide independent assurance to Parliament and the public that government funds are being spent efficiently and effectively, and in accordance with the law.

Performance audits seek to improve the efficiency and effectiveness of government agencies so that the community receives value for money from government services.

Performance audits also assist the accountability process by holding managers to account for agency performance.

What are the phases in performance auditing?

Performance audits have three key phases: planning, fieldwork and report writing.

During the planning phase, the audit team will develop audit criteria and define the audit field work.

At the completion of field work we will meet with agency management to discuss all significant matters arising out of the audit. Following this, we will prepare a draft performance audit report.

We meet with agency management to check that facts presented in the report are accurate and that recommendations are practical and appropriate. Following this, a formal draft report is provided to the CEO for comment. The relevant Minister is also provided with a copy of the final report. The final report, which is tabled in Parliament, includes any comment made by the CEO on the conclusion and the recommendations of the audit.

Depending on the scope, performance audits can take several months to complete.

Copies of our performance audit reports can be obtained from our website or by contacting our Office.

How do we measure an agency's performance?

During the planning phase, the team develops the audit criteria. These are standards of performance against which the agency or program is assessed. Criteria may be based on best practice, government targets, benchmarks, or published guidelines.

Do we check to see if recommendations have been implemented?

Every few years we conduct a follow-up audit. These follow-up audits look at the extent to which action has been taken to address issues or recommendations agreed to in an earlier performance audit.

The Public Accounts Committee (PAC) may also conduct reviews or hold inquiries into matters raised in performance audit reports. Agencies are also requested to report actions taken against each recommendation in their annual report.

Who audits the auditors?

Our performance audits are subject to internal and external quality reviews against relevant Australian and international standards. This includes ongoing independent certification of our ISO 9001 quality management system.

The PAC is also responsible for overseeing the activities of the Audit Office and conducts a review of our operations every three years.

Who pays for performance audits?

No fee is charged for performance audits. Our performance audit services are funded by the NSW Parliament and from internal sources.

Further information

Further information can be obtained from our website www.audit.nsw.gov.au or by contacting us on 9275 7277.

Performance Audit Reports

No	Agency or Issues Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
180	Follow-up of 2003 Performance Audit	*Protecting Our Rivers*	May 2008
179	NSW Office of Liquor, Gaming and Racing; NSW Police Force	*Working with Hotels and Clubs to reduce alcohol-related crime*	23 April 2008
178	Greyhound and Harness Racing Regulatory Authority	*Managing the Amalgamation of the Greyhound and Harness Racing Regulatory Authority*	3 April 2008
177	Office of the Director of Public Prosecutions	*Efficiency of the Office of the Director of Public Prosecutions*	26 March 2008
176*	Better Practice Guide	*Implementing Successful Amalgamations*	5 March 2008
175	Department of Commerce Department of Primary Industries	*Managing Departmental Amalgamations*	5 March 2008
174	Department of Education and Training	*Ageing workforce - Teachers*	13 February 2008
173	NSW Police Force	*Police Rostering*	5 December 2007
172	Department of Primary Industries	*Improving Efficiency of Irrigation Water Use on Farms*	21 November 2007
171	Department of Premier and Cabinet Department of Commerce	*Government Advertising*	29 August 2007
170	RailCorp	*Signal Failures on the Metropolitan Rail Network*	15 August 2007
169	NSW Police Force	*Dealing with Household Burglaries*	27 June 2007
168	Ministry of Transport	*Connecting with Public Transport*	6 June 2007
167	Follow-up of 2001 Performance Audit: Ambulance Service of New South Wales	*Readiness to Respond*	6 June 2007
166	Follow-up of Performance Audit Department of Education and Training	*Using Computers in Schools for Teaching and Learning*	9 May 2007
165	Homelessness	*Responding to Homelessness*	2 May 2007
164	Department of Juvenile Justice NSW Police Force	*Addressing the Needs of Young Offenders*	28 March 2007
163	Legal Aid Commission of NSW	*Distributing Legal Aid in New South Wales*	13 December 2006
162	NSW Health	*Attracting, Retaining and Managing Nurses in Hospitals*	12 December 2006
161	Follow-up of 2003 Performance Audit	*The Police Assistance Line*	6 December 2006
160	NSW Health	*Helping Older People Access a Residential Aged Care Facility*	5 December 2006

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159	NSW Health	*Major Infectious Disease Outbreaks: Readiness to Respond*	22 November 2006
158	Department of Education and Training	*Educating Primary School Students with Disabilities*	6 September 2006
157	Roads and Traffic Authority	*Condition of State Roads*	16 August 2006
156*	Fraud Control	*Fraud Control Improvement Kit: Meeting Your Fraud Control Obligations*	20 July 2006
155	Follow-up of 2002 Performance Audit	*Regulating the Clearing of Native Vegetation*	19 July 2006
154	Follow-up of 2002 Performance Audit	*Managing Sick Leave in NSW Police and the Department of Corrective Services*	June 2006
153	Performance Information	*Agency Use of Performance Information to Manage Services*	21 June 2006
152	Roads and Traffic Authority	*The Cross City Tunnel Project*	31 May 2006
151	Department of Corrective Services	*Prisoner Rehabilitation*	24 May 2006
150	Follow-up of 2000 Performance Audit	*Fare Evasion on Public Transport*	26 April 2006
149	Agency Collaboration	*Agencies Working Together to Improve Services*	22 March 2006
148	Department of Education and Training	*The New Schools Privately Financed Project*	8 March 2006
147	Premier's Department	*Relocating Agencies to Regional Areas*	14 December 2005
146	Bus Transitways	*Liverpool to Parramatta Bus Transitway*	5 December 2005
145	Follow-up of 2002 Performance Audit	*Purchasing Hospital Supplies*	23 November 2005
144	NSW Treasury	*Oversight of State Owned Electricity Corporations*	19 October 2005
143	Asset Management	*Implementing Asset Management Reforms*	12 October 2005
142	Department of Juvenile Justice	*Managing and Measuring Success*	14 September 2005
141	State Budget	*In-year Monitoring of the State Budget*	28 July 2005
140	State Rescue Board of New South Wales	*Coordination of Rescue Services*	20 July 2005

* Better Practice Guides

Performance audits on our website

A list of performance audits tabled or published since March 1997, as well as those currently in progress, can be found on our website www.audit.nsw.gov.au.

If you have any problems accessing these reports, or are seeking older reports, please contact our Office Services Manager on (02) 9275 7116.