

ENVIRONMENTAL AUDIT OF THE GOULBURN RIVER – LAKE EILDON TO THE MURRAY RIVER

9 FINDINGS AND RECOMMENDATIONS

The findings and recommendations of the environmental audit for the audit criteria are presented below.

The findings are drawn from the evidence presented in Sections 4 to 8 and the appendices.

For many findings recommendations are not warranted. For all other findings, specific recommendations have been prepared. Consequently each recommendation is linked to the relevant finding. **All recommendations appear in bold type.**

The recommendations are prioritised in Section 11 based upon the potential risks of harm to the health of the Goulburn River if the recommendations are not adopted in the medium term. Suggested agency responsibilities for implementation of the recommendations are also assigned in Section 11.

9.1 Criterion 1—Environmental quality objectives and indicators

Audit reach 1

1. The SEPP (WoV) water quality environmental quality objectives and indicators were generally met in audit reach 1 during 2002/03 and 2003/04. The exceptions were nitrates and nitrites (both years) and dissolved oxygen (2003/04 only).
2. The average dissolved oxygen percentage 25th percentile saturation level for 2003/04 was considerably lower than the average over the 1985 to 2003 period.

Investigate the cause of the low dissolved oxygen in audit reach 1 between July 2002 and June 2003.

Audit reach 2 and 3

3. Water quality is not routinely monitored along audit reaches 2 and 3 as they are not streams.

Establish permanent water quality monitoring stations within audit reaches 2 and 3.

4. The 2002 expert panel's ecological review of Lake Nagambie and the Goulburn weir pool (audit reaches 2 and 3) identified septic tank systems in the Picnic Point area, run-off from the Tahbilk area and other environmental issues as posing potential threats to the health of the lake and the weir pool.

Address the potential environmental threats to the health of Lake Nagambie and the Goulburn weir pool (audit reaches 2 and 3) which were identified in the expert panel's 2002 ecological review.

Audit reach 4

5. The SEPP (WoV) water quality environmental quality objectives and indicators were not fully met during 2002/03 and 2003/04 at any of the three water quality monitoring sites in audit reach 4. Parameters for which the objectives were not met were nitrate, nitrite, dissolved oxygen, filterable reactive phosphorus, total phosphorus, total nitrogen, turbidity, As, Cr, Cu, and Zn. The period of non-conformance varied between parameters and monitoring sites.

6. Low dissolved oxygen was associated with a significant fish kill downstream of the Goulburn Weir in January 2004.

Assess whether summer and late spring releases from the Goulburn Weir's vertical lift gates will increase downstream dissolved oxygen levels and are technically feasible for short-term periods. (Technical issues include management of occupational health and safety risks and accurate flow monitoring.) If so, consider releases from the vertical lift gates when the dissolved oxygen falls below agreed trigger levels to reduce the risk of fish kills.

General

7. The SEPP (WoV) biological environmental quality objectives are not fully met at any of the sites sampled by the EPA along audit reaches 1 and 4. This finding is based upon the Auditor's review of the EPA's draft 'Goulburn Broken Catchment Management Authority Rivers and Stream Assessment' which utilised 1997 to 2000 biological data.
8. The Goulburn Broken CMA is responsible for determining whether the water quality objectives will be obtained over the 10-year life of the SEPP (WoV).
9. The Goulburn Broken CMA has not stated whether the SEPP (WoV) water quality objectives will be met, and when they will be met (i.e. within the ten-year of the SEPP (WoV) timeframe, in the long term, or not at all).

Clarify, through the RRHS, whether and when the SEPP (WoV) water quality objectives will be met.

10. There is not an integrated and routine water quality monitoring program with appropriate resource condition targets (RCTs) to provide the necessary information to determine whether releases from Lake Eildon and the Goulburn Weir pose environmental risks to beneficial uses.

Establish stream management unit RCTs, through the RRHS, for all SEPP (WoV) water quality and biological environmental quality objectives. If these are to be subject to an additional ecological risk assessment process, establish and apply short-term targets until the ecological risk assessment is completed.

Establish an integrated routine water quality monitoring evaluation and reporting program which can be used to determine whether the endorsed RRHS and SEPP (WoV) Attainment Program targets are being met. The program should:

- **build upon existing monitoring programs and include ambient water quality monitoring**
- **allow for the determination of whether releases from Lake Eildon and Goulburn Weir pose environmental risks to beneficial uses**
- **include monitoring for turbidity, nutrients, temperature, dissolved oxygen and any other pollutants considered necessary.**

11. The opportunity to achieve many of the SEPP (WoV) environmental quality objectives and indicators, VRHS objectives, and NFS targets, that are not currently achieved, within the 10-year timeframe of the SEPP (WoV) could be improved if aspirational targets, RCTs and management action targets (MATs) which reflect these objectives, are adopted.

See recommendation for audit finding 14.

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12. A few SEPP (WoV) water quality objectives are addressed by the Goulburn Broken Water Quality Strategy. This strategy has several broad catchment-based water quality objectives.

9.2 Criterion 2—Attainment program

13. SEPP (WoV) Attainment Programs can be established at the local scale, for specific river reaches, and at the catchment scale.
14. A consolidated Goulburn River Attainment Program has not been established nor is there a comprehensive framework for its establishment which is fully compliant with the SEPP (WoV) requirements.

Establish a SEPP (WoV) Attainment Program for the Goulburn River between Lake Eildon and the Murray River including the Goulburn weir pool and Lake Nagambie.

15. The May 2005 draft RRHS provides a mechanism to achieve many of the Attainment Program elements as identified in Part 4 of the SEPP (WoV). There are however a significant number of SEPP (WoV) elements for which RRHSs are not considered the appropriate Attainment Program implementation vehicle. Examples are the management of wastewater discharges area mixing zones, groundwater management, and catchment management activities including forestry, recreational activities and extractive industries.
16. The May 2005 draft RRHS, which has been guided by the VRHS, is generally accepted by DSE, EPA, CMA and G-MW as being consistent with the SEPP (WoV).
17. The May 2005 draft RRHS could be refined to provide a comprehensive and consolidated framework for the SEPP (WoV) Attainment Program. For those aspects of the Attainment Program, for which there are other more appropriate implementation vehicles, the RRHS could confirm the necessary linkages or simply attach a list of attainment matters not covered by the RRHS.

Identify and endorse the appropriate vehicle(s) for the Goulburn River SEPP (WoV) Attainment Program. This could be the RRHS or a separate attainment program that is effectively linked to the RRHS.

Recognise complementary regulatory instruments, strategies and plans that are required to meet relevant objectives of the endorsed Attainment Program vehicle(s).

Avoid duplication of river health target setting processes, by ensuring there are transparent linkages between relevant natural resource strategies and plans and the SEPP (WoV) Attainment Program.

18. The draft RRHS has not been endorsed by Government. In its absence the 2002 WQS provides a framework for some Attainment Program elements such as the target of a 65% reduction in phosphorus export from the entire catchment.

9.3 Criterion 3—Catchment management authorities

19. The May 2005 draft RRHS has been developed by the CMA in partnership with agency and community stakeholders.
20. The May 2005 draft RRHS documents the Goulburn River's environmental assets, social assets and economic assets. These are located within the RIVERS database.

21. The May 2005 draft RRHS (Section 3) states 'The regional environmental, social, and economic assets used in the draft RRHS equate in general terms to the beneficial uses protected by the SEPP (WoV)'.

Document the linkages between the beneficial uses and the assets within the RRHS.

22. The draft RRHS identifies medium- and long-term RCTs and MATs for audit reach 4 and short-term RCTs and MATs, for guidance purposes, for audit reaches 1,2, and 3. The adequacy of the targets is addressed in Section 9.4 (Criterion 4—Regional target setting).
23. While the May 2005 draft RRHS risk-based assessment approach to rating the threats to the Goulburn River's environmental, economic, or social assets has been a useful process, the information on these assets has not been used in an integrated fashion (such as Multiple Criteria Assessment) to set appropriate goals, priorities and environmental targets for the River, particularly for reach 1, where there are competing beneficial uses. For this reason the social and economic asset values do not appear to have been 'carefully considered [in] setting the goals, priorities and targets' for the draft RRHS as required under Clause 15 of the SEPP (WoV).

Finalise the RRHS and develop a linked SEPP (WoV) Attainment Program after taking full account of the social and economic needs as well as environmental risk aspects for all audit reaches. This should be achieved through extensive stakeholder engagement and by using assessment tools such as Multi Criteria Assessment (utilising the outcomes of any additional water quality-related ecological risk assessment).

9.4 Criterion 4—Regional target setting

Aspirational targets

24. The May 2005 draft RRHS aspirational target for the Goulburn River below Lake Eildon is not clearly articulated. Section 5 of the RRHS states that the objectives for high priority waterways in the Goulburn River are 'protecting the rivers that are of highest community value from any decline in condition, and maintaining the condition of ecologically healthy rivers', whereas Program A which incorporates the Goulburn River reaches below Lake Eildon is based upon protection and enhancement of the high priority waterways. The Goulburn Broken CMA has advised the Auditor that the intent of the strategy for high priority waterways is to 'protect and enhance', and that this will be reflected in the introduction to the government endorsed RRHS.
25. The aspirational targets of the RCS, the WQS, and the SEPP (WoV) are generally consistent and are based upon improving the overall river health. For example the RCS aims to 'improve the overall condition of rivers and streams rated as "marginal", "poor", and "very poor" by 2050', and the SEPP (WoV) requires improvement in environmental quality where the environmental quality objectives are not met (Clauses 11 (3) and (4)).

Resource condition and MATs

26. The RCS includes water related RCTs and MATs. These are broad-based and establish linkages with the draft RRHS, the Wetlands Strategy, the WQS, and the Regional Floodplain Management Strategy. The RCS water related targets generally defer to the RRHS.

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27. The May 2005 draft RRHS indicates that clear management objectives will be established for audit reaches 1, 2 and 3 by conducting a deliberate forum with major stakeholders and community representatives. Short-term RCTs and MATs are set for this reach, including nutrient and turbidity targets. Longer-term RCTs and MATs are set for audit reach 4. These generally reflect the VRHS requirements for RRHSs.

Update the short-term RCTs and MATs for audit reaches 1, 2 and 3 once clear management objectives are established and review existing targets for audit reach 4. These targets should:

- **reflect the SEPP (WoV) Clause 24 requirements for regional target setting**
 - **consider the 'Secondary Contact Recreational', 'Aquaculture', and 'Fish, Crustacea and Molluscs for Human Consumption' beneficial uses as they relate to both native and exotic fish**
 - **be based upon a full evaluation of the environment, social and economic impacts**
 - **consider key threats to the assets (i.e. significant point source discharges)**
 - **include thermal water quality targets and fish recruitment and survival.**
28. The RCTs and MATs for audit reaches 1 and 4 do not address all SEPP (WoV) environmental quality objectives.
29. The RRHS could provide a framework for the development of environmental quality RCTs based upon the SEPP (WoV) environmental quality objectives.

Precedence

30. The RRHS sits within the RCS framework. As a consequence the RCS aspirational targets, RCTs condition and MATs take precedence over the RRHS targets (for circumstances in which they may be in conflict). It is noted that the RCS references the RRHS and its sub-strategies (wetland, floodplain and water quality) for several river health RCT targets.

Revise the Goulburn Broken RCS to ensure that it adopts all RRHS and sub-strategies RCTs and MATs and that other river health targets are removed.

General

31. The May 2005 draft RRHS target setting framework, while appropriate for addressing the threat of heavy metals to the Goulburn River, has not been applied to these parameters. Clarification is required to determine whether this is because metals have been investigated and found to be non-threatening or they have not been fully considered.
32. The May 2005 draft RRHS framework does not provide specific implementation programs to address SEPP (WoV) environmental quality objectives, as this is not a VRHS requirement. (The VRHS states that the SEPP (WoV) will recognise the regional catchment planning processes whereby regional communities set regional targets to move towards the SEPP (WoV) environmental quality objectives after consideration of social, economic, and social assets.)
33. The draft RRHS monitoring, evaluation and reporting program does not directly reference the proposed RCTs and MATs for audit reach 4. The draft RRHS does not require monitoring along audit reach 1 until objectives for the reaches are set.

See recommendations for audit finding 10.

34. The adequacy of physical and human resources to undertake river health monitoring activities as specified in the May 2005 draft RRHS and to monitor the performance of the SEPP (WoV) Attainment Program will be dependent on the final RCTs and MATs required to implement the targets, and the allocated budget.
35. An indicative investment of \$100 million is required to fund the RRHS over the period 2004–2014. The level of investment for the RRHS will be determined as part of the yearly investment process by DSE and from other funding sources available to the relevant stakeholders to implement identified actions.
36. The EPA and DSE have worked with the Goulburn Broken CMA to establish a process and timelines for the development of draft RRHS river health targets. This guidance includes the production and distribution of the DSE 'Guidelines for the Preparation of a Regional River Health Strategy' and the 'Clarification of the 10-year targets required in regional river health strategies'. The later document lists reductions in nutrient, salinity, and sediment loads as well as % of relevant SEPP (WoV) objectives for key monitoring sites as RCTs.
37. Further development of the RCTs and MATs and the monitoring, evaluation and reporting program is required before an assessment of whether the RCS, the draft RRHS, and the WQS can provide for the progressive rehabilitation of the Goulburn River.

9.5 Criterion 5—Water allocations and environmental flows

38. Environmental flows can only be provided by amending the relevant Bulk Entitlement Conversion Order.
39. The environmental water reserves (EWRs) are currently being identified for all Victorian catchments through the development of sustainable water strategies.

Complete the identification of EWR requirements for the Goulburn River. These requirements should be consistent with the RRHS aspirational targets, RCTs and MATs along all stream management units including the yet to be established management objectives for audit reaches 1, 2, and 3.

40. DSE, G-MW, and irrigators within the Goulburn catchment are working together to increase water availability for the environment by implementing water savings measures and allocating 20% of new sales water to the environment. Although these environmental flows are likely to be allocated to the Snowy and Murray Rivers, they will flow along the Goulburn River downstream of Lake Eildon.
41. G-MW did not approve increased entitlements from the Goulburn River system between July 2003 and June 2004.
42. Through the Victorian Government's White Paper 'Our Water Our Future' expert assessments of the State's water resources will be conducted every 15 years to determine whether river health is deteriorating for flow-related reasons. Additionally the RRHS states that the DSE will from time to time conduct audits of regional integrated floodplain and waterway management programs and the EPA will develop an auditing system to enable audits of the protection of beneficial uses. While there is an audit framework present, there is not a clear schedule in place to review and independently audit environmental flows and their effectiveness in protecting beneficial uses.

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Finalise the development of tool(s) to assess the effectiveness of environmental releases to Victorian streams. In developing the tool(s) consideration should be given to utilising the ISC, the RiVERS measures, and SEPP (WoV) water quality objectives as possible measures of the effectiveness. The national review of approaches to ecological responses to environmental flows monitoring being undertaken by the CRC for Freshwater Ecology should be considered in the development of the tool.

9.6 Criterion 6—Thermal water quality objectives

43. The water temperature of the Goulburn River downstream of Lake Eildon is up to 6.5°C cooler than it would have been prior to the construction of Sugarloaf Reservoir and subsequently Lake Eildon.
44. Thermal water objectives have not been set for the Goulburn River and hence releases from Lake Eildon are not influenced by temperature considerations.
45. G-MW identifies river temperature fluctuations below Lake Eildon as a significant environmental risk in the G-MW Significant Environmental Risk Register. It is not clear what obligations G-MW has under its EMS to reduce the risk.

Determine G-MW obligations under its EMS to reduce the risk of temperature fluctuations below Lake Eildon on flora, fauna, loss of habitat and loss of amenity.

46. Native and introduced fish, including desirable species such as Brown and Rainbow trout and undesirable species such as Carp, may be beneficial uses to be protected along the Goulburn River. In general introduced species spawn and survive in cold water environments, such as provided by Lake Eildon releases, and native fish spawn and survive in warmer waters.
47. While the Goulburn Eildon Fisheries Management Plan establishes specific management objectives for audit reach 1, the issue as to whether this reach should be managed as a cold-water fishery for recreational fishing of trout and other introduced species or should be ameliorated to allow for the re-establishment of native fish will not be resolved until a decision is made as to which beneficial uses are to be protected. This decision can only be made once the clear management objectives are established through the RRHS.

Consider closer integration of the Goulburn Eildon Fishery Management Plan with the RRHS to ensure that the RCT targets of both strategies are consistent and are developed through the same stakeholder consultation process.

In the development of long-term RRHS RCTs and MATs for audit reach 1 consider the social and economic, as well as the environmental, impacts of providing for warmer water releases from Lake Eildon and the inability to provide an optimal temperature regime for both native and exotic fish.

9.7 Criterion 7—Other river health objectives and targets

48. Routine monitoring of the recruitment and survival of Trout cod and Spotted tree frogs is conducted as part of the National Recovery Plan along some reaches of the Goulburn River.
49. The three-year program to survey fish communities downstream of the Goulburn Weir (audit reach 4) undertaken by the Arthur Rylah Institute for Environmental Research will be completed in June 2006.

50. Apart from the above program, routine monitoring of the recruitment and survival of threatened native fish that are present in the Goulburn River, including Barred galaxias, Murray cod and Macquarie perch, is not conducted.
51. The May 2005 draft RRHS indicates that a process will be put in place to monitor and audit native fish populations in audit reach 4 as required under the MDBC Native Fish Strategy. This process will be put in place in the implementation phase of the Goulburn environmental flow project. Monitoring of native fish within audit reaches 1, 2, and 3 does not appear to be proposed within the draft RRHS. In its response to the draft audit report on matters of fact DSE advised that ecological monitoring will be undertaken through the Sustainable Rivers Audit.

Ensure that the RRHS process to monitor and audit native fish populations includes all threatened fish species. The monitoring program should obtain sufficient data to assess whether the RRHS fish-related aspirational targets, RCTs and MATs are being met. The program should be implemented as soon as practicable.

Ensure that the RRHS aspirational targets, RCTs and MATs for native and exotic fish are considered in the development of the Goulburn River's Environmental Water Reserve.

52. The May 2005 draft RRHS RCTs for audit reach 4 are consistent with the MDBC's Living Murray Strategy and the Integrated Management Strategy.
53. The draft RRHS makes specific reference to the VRHS definition of an ecologically healthy river and generally satisfies the VRHS objectives for regional river health strategies (Section 5.2.2 of the VRHS).
54. The Goulburn Eildon Fisheries Management Plan confirms that substantial recreation and aquatic investment has developed around salmonids along audit reach 1. The environmental threats to salmonids along this audit reach include low winter flows, elevated temperatures (during summer), and high flows in the early part of the irrigation season.
55. High early irrigation season flows limit the fry growth stage survival of trout by reducing the available area of low flow velocities. Trout numbers could increase substantially if these early season flows were reduced.
56. A minimum winter flow of 250 ML/day is considered necessary to maintain a suitable trout spawning habitat.
57. The Goulburn Weir acts as a barrier to the upstream movement of native fish. A study is underway to determine the feasibility of constructing a fish ladder at the weir.

Consider the viability of constructing a fish ladder at the Goulburn weir having regard to the outcomes of the feasibility study. The viability should be considered in consultation with relevant stakeholders including local angling committees.

58. Anglers are concerned that the current management arrangements to control the level of the Goulburn weir pool and Lake Nagambie are impacting on fish populations.

Review the current management arrangements for altering the level of the Goulburn weir pool and Lake Nagambie.

Obtain an improved understanding of ecological processes within the Nagambie Lakes system (audit reaches 3 and 4). This should be achieved by addressing the knowledge gaps identified in the 2002 assessment by the scientific expert panel.

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9.8 Criterion 8—Water Act—Environmental management obligations

Section 107—Authorities (Part 6, Division 3)—Environmental and recreational areas

59. To the Auditor's knowledge G-MW has not requested the Minister to declare any environmental or recreational areas and by-laws have not been established to provide for the conservation and preservation of flora, fauna, and habitat. An environmental or recreational area could include a perimeter buffer around the Goulburn weir pool.

Consider declaring a perimeter buffer around the Goulburn weir pool as 'an environmental and recreational area' under s. 107 of the *Water Act*. This would provide a powerful mechanism to provide for effective multiple use management including the preservation of native flora and fauna and minimising the risk of contaminated water entering Lake Nagambie and the Goulburn weir pool.

Section 189—Waterway Management (Part 10, Division 2)—Functions of Authorities

60. The Goulburn River has been declared a designated waterway, and the land within 20 m of the river is designated land. The Goulburn Broken CMA uses the RCS and supporting strategies and plans to meet its obligations under this section of the *Water Act*.

Section 195—Waterway Management (Part 10, Division 2)—Control over connections and discharges

61. As a public authority, G-MW is exempt from s. 195(1). G-MW obligation under s. 195(2) is: 'A licensee or public statutory body that intends to do anything specified in subsection (1) must, before doing it, notify the Authority of its intention and take into account any comments made by the Authority'.

62. G-MW meets s. 195(2) obligations by having proposals for such connections put on the agenda and reported on at the Goulburn Broken CMAs Shepparton Irrigation Region (SIR) Surface Water Management Strategy sub-committee meetings. This sub-committee oversees aspects of G-MW drain construction, including drainage connections to waterways and endorses G-MW budgets for drain construction and programmed works. Annual reporting of performance against programs is also carried out.

Consider whether to place performance and reporting conditions on new drain connections.

Section 199—Regional Drainage (Part 10, Division 3)—Functions of Authorities

63. The Act is not clear as to how the Authority should demonstrate how it has performed the functions listed in s. 199 in 'an environmentally sound way'.

64. The CMA does not have any obligations under s. 199 as it does not have a regional drainage scheme within its dryland area.

65. The CMA has an 'Order in Council' for regional drainage. As part of its obligations under the Order in Council the CMA has prepared:

- the Regional Catchment Strategy
- the May 2005 draft RRHS.

66. G-MW does not have any responsibilities under s. 199 as it is not a regional drainage authority.
67. G-MW derives the bulk of its drainage powers from s. 10 and s. 221 of the *Water Act*. Section 10 refers to the rights of an Authority to construct or operate works which may result in the drainage of any land. Section 221 lists the functions of an Authority in relation to irrigation. These include 'drainage of those (irrigated) lands', 'plan for the future needs of the community in relation to...drainage and salinity mitigation', and 'develop and implement programs for improved...drainage practices'.
68. Within the Goulburn catchment, G-MW meets its s. 221 drainage obligations through the co-operative development and implementation of the SIR Surface Water Management Strategy and through its participation, as a signatory, in the 2004 Irrigation Drainage Memorandum of Understanding.

Section 213—Water Management Schemes (Part 10, Division 5)

69. There are no Division 5 water management schemes within the Goulburn River catchment.

9.9 Criterion 9—Bulk Water Entitlements and Agreements

Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995

70. The Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order came into operation on 1 July 1995.

Clause 4—Goulburn Resource Manager

71. The letter of 14 August 1997 from DNRE (now DSE) appointing G-MW as the 'Resource Manager' for the Goulburn system has been inspected. G-MW has advised that the 'Resource Manager' appointment lapsed some time ago and the Resource Manager powers and responsibilities have reverted to the Minister. In its response to the draft audit report on matters of fact, DSE advised that G-MW has recently been reappointed as the Resource Manager. It is not clear to the Auditor how these responsibilities were administered during the lapse in the appointment.
72. G-MW continues to prepare Goulburn Resource Manager reports which are submitted to DSE on behalf of the Minister.

Clause 11—Passing flows

73. The Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order minimum passing flow requirements are based upon a limited review of the environmental water needs of the Goulburn River. The passing flows were restricted by the Government's policy to maintain reliability of supply for consumptive users.
74. Both the Goulburn Resource Manager reports and the Auditor's check are generally consistent and suggest almost complete Clause 11 (Passing flow) compliance with only minor excursions. The Auditor is satisfied that the quality assurance procedures put in place by G-MW are adequate to address minor excursions from the Clause 11 requirements.

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Clause 12.3—Releases

75. Annual performance against Clause 12.3 requirements is documented in the Appendices to the annual Goulburn Resource Manager reports. These reports indicate complete compliance with the control of release obligations under Clause 12.3.
76. Releases of water from Eildon Dam to augment water available for use from the River Murray, and/or to maintain water quality in the waterway, did not occur between 2000/01 and 2002/03. DSE has advised that this is due to the seasonal allocation for consumptive use being less than 150% of the water right during these years. This trigger is not documented in the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order.

Clause 15—Environmental obligations

77. G-MW wrote to DNRE (now DSE) on 30 August 1996 submitting a suite of measures for the Minister's approval. A copy of the letter with the suite of measures which acted as a program to manage bulk entitlement-related environmental effects (as required under Clause 15.1) has been inspected. The program appears to be 'strategic' rather than operational as required under Clause 15.1. The DNRE (now DSE) and the Minister have not responded to the letter.
78. The Auditor has inspected three Goulburn Resource Manager annual reports and found that they have minimal information on the environmental aspects listed in Clause 15.1 apart from flow records. For this reason it is not possible to confirm compliance with the intent of Clause 15.1 of the BE Order.

Respond to G-MW's proposed program to manage the environmental effects of G-MW works as required under Clause 15.1 of the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order or suggest an alternative approach to meet these obligations. In doing so provide guidance to G-MW to assist the authority to refine the Annual Goulburn Basin Water accounts reports to reflect all environmental reporting requirements under Cl. 15.1.

Revise the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order to ensure that the environmental obligations for managing the environmental water reserve are clear, transparent and auditable.

Monitoring and auditing process (in relation to Clauses 11, 12.3 and 15)

79. G-MW contracts Thiess to monitor, measure and analyse the hydrographic data they supply to G-MW.
80. For minor non-compliances of the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order, an internal report, including actions to prevent a recurrence, is submitted to G-MW management and drawn to the attention of DSE in the annual report.
81. The Auditor has inspected the G-MW internal memorandum of 25 September 2002 regarding the minor breach of the minimum passing flow at McCoys Bridge on 18 August 2002. As required this was brought to the attention of DSE in the 2002/03 Goulburn Resource Manager's report.
82. G-MW is required to notify DSE immediately of more 'significant' breaches. To the Auditor's knowledge no 'significant' breaches of environmental aspects of the BE Order Clauses 11, 12.3 and 14 have occurred over the audited period. This finding is based upon the Auditor's subjective judgement of environmental significance, G-MW's documentation of breaches, and the Auditor's assessment of selected data sets. In the absence of guidance from DSE, G-MW currently decides what constitutes a 'significant' breach.

Clarify what constitutes a 'significant' breach of the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order.

83. G-MW had advised that the Bulk Entitlement has been reduced recently to meet the water savings associated with Schedule I of the Water Savings Project. This is the 'Project for Improved Measurement of Small Value Entitlement Supplied to Irrigation Districts'.

Bulk Entitlement (Shepparton) Conversion Order 1995

84. The Goulburn Resource Manager 2000/01 to 2002/03 reports confirm that GVRWA's annual diversion is below the Bulk Entitlement (Shepparton) Conversion Order 1995 limit. In addition, the Resource Management reports state that the maximum daily diversion limit of 100 ML/d is not exceeded.

Continue to amend G-MW's BE Order as the Environmental Water Reserve is established through the water savings program. The Environmental Water Reserve should be consistent with the negotiated flow regime arising out of the completion of the RRHS's environmental flow program.

Southern Hydro and Pacific Hydro Agreements

85. As G-MW is ultimately responsible for water releases from Eildon Dam and the Eildon Pondage, it was not necessary for the Auditor to verify whether Southern Hydro and Pacific Hydro are meeting their contractual obligations for operating hydro-electric power stations.

9.10 Criterion 10—G-MW operational licence

86. G-MW does not, and is not required to, have an operational licence with the Government.
87. G-MW has a Statement of Obligations under the *Water Industry Act 1994* which came into effect in January 2005. Clause 23 of the Statement of Obligations requires the Authority to manage the impacts of its activities on any waterway or wetland to minimise the environmental impact on and risks to the aquatic ecosystem, and to liaise with the Goulburn Broken CMA to ensure that environmental flow regimes are managed to maximise ecological benefits. (Compliance with this responsibility has not been specifically assessed in the audit.)

9.11 Criterion 11—Other Acts relevant to river health

Catchment and Land Protection Act

88. Under the *Catchment and Land Protection Act*, 'noxious weed' means a State prohibited weed, a regionally prohibited weed or a regionally controlled weed. The Minister has the power to declare a plant a noxious weed under any of the categories. Section 70 of the Act gives the DSE Secretary power to direct landowners to prevent the growth or spread of State prohibited weeds.
89. The Auditor has been advised that there are several emerging riparian weeds in the Goulburn Broken catchment that are not declared noxious weeds and that the capacity of agencies to provide regulatory support to implement a co-ordinated weed control program is limited.

Review processes for declaring noxious riparian weeds and ensure adequate resources are available to respond to emerging environmental and agricultural weeds.

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Flora and Fauna Guarantee Act

90. Trout cod, Macquarie perch, Murray cod, Silver perch, Freshwater catfish, Murray hardyhead and Murray rainbowfish are listed as 'threatened fauna' under the *Flora and Fauna Guarantee Act 1988* (the *FFG Act*) and are found within the Goulburn River below Lake Eildon.
91. The May 2005 draft RRHS (Appendix 14) notes that an Action Statement has been prepared for Trout cod.
92. The Act also lists 'potentially threatening processes' that may affect freshwater aquatic environments. These include the following that relate to the Goulburn River:
 - alteration to the natural flow regimes of rivers and streams
 - alteration to the natural temperature regimes of rivers and streams
 - degradation of native riparian vegetation along Victorian rivers and streams
 - increase in sediment input into Victorian rivers and streams due to human activities
 - input of toxic substances into Victorian rivers and streams
 - introduction of live fish into waters outside their natural range within a Victorian river catchment
 - prevention of passage of aquatic biota as a result of the presence of in-stream structures
 - removal of wood debris.

None of the above threatening processes are identified on the DSE web site as having approved action statements.

Complete FFG Action Statements for all threatened species and threatening processes that are relevant to the Goulburn River below Lake Eildon.

As Action Statements are completed review and update the RRHS to ensure that it is consistent.

93. DSE has advised that copies of all completed FFG Action Statements are available through the DSE's Customer Service Centre. The Auditor has not been able to obtain copies via this service.
94. These potentially threatening processes have not been prioritised within the May 2005 draft RRHS despite alteration of the natural flow regimes and alteration of the natural temperature regimes being recognised in the draft RRHS as significant risks.

Ensure that the RRHS RCTs are linked with and reflect threatened species and threatening processes Action Plans relevant to the Goulburn River.

95. Fisheries Victoria has developed the Aquatic Animal Disease Emergency Preparedness Guideline and the Guidelines for Assessing Translocations of Live Aquatic Organisms in Victoria as management tools to assist in protecting threatened aquatic species.

Heritage Rivers Act

96. The Auditor has not inspected the area.
97. The Auditor is not aware of any new impoundments, artificial barriers or structures that have been constructed along the Goulburn River since 2003.

98. No new water diversion (i.e. taking of water under a bulk entitlement, licence or agreement) from the Goulburn River upstream from the lowest point of the Goulburn River Heritage Area has been granted since 2003.

Environment Protection and Biodiversity Conservation Act

99. Barred galaxias, Trout cod, Macquarie perch, Murray cod, and Murray hardyhead are threatened species under the *EPBC Act*.
100. Any modification to the operation and management of the Goulburn River which could potentially have an impact on the above endangered flora and fauna must be referred to the Australian Government.
101. The Auditor is not aware of any significant modifications to the operation and management of the Goulburn River since 2003 that could have triggered a referral under the *EPBC Act*.

The finding associated with the use of biocides in G-MW channels and drains as it relates to the *EPBC Act* referral process is discussed in Section 9.16.

9.12 Criterion 12—Legislation, Policies and Strategies

102. G-MW's legal counsel believes that there is an inconsistency between SEPP (WoV) Clause 41 'Water Allocations and Environmental Flows' and G-MW's Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995 as it relates to G-MW's ability to implement measures to provide environmental flows.

Seek clarification as to the best way forward to resolve the likely inconsistency between the SEPP (WoV) Clause 41 'Water Allocations and Environmental Flows' and Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995 as it relates to G-MW's ability to implement measures to provide environmental flows.

103. The overarching objectives of the RCS, the draft RRHS, and the VRHS, and the Murray Darling Basin Commission's NFS are generally consistent. Until 5-year and 10-year RRHS targets are set for audit reach 1, it will not be possible to determine whether the RCT and MAT targets for the RRHS are consistent with the NFS.
104. The overall objectives of the VRHS, the RCS, and the SEPP (WoV) Attainment Program are consistent; that is to improve river health.
105. Implementation of the Victorian Government White Paper 'Our Water Our Future' will require reform of the *Water Act*. Many of the issues to be addressed in this reform are raised by Phillip Fox (2005) 'Recommendations for Legislative Implementation of White Paper's Proposed Reform' on behalf of Environment Victoria, the Environment Defenders Office, the Australian Conservation Council, and the WWF.
106. Implementation of the White Paper 'Our Water Our Future', particularly the development of Environmental Water Reserves, may assist in addressing the inconsistency between the SEPP (WoV) Clause 41 (Water Allocations and Environmental Flows) and the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order. It will however be important to reform the BE Order to ensure that the environmental obligations for managing the EWR are clear, transparent and auditable.

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Reform the *Water Act* as soon as practical to allow for the effective implementation of the Victorian Government's White Paper 'Our Water Our Future', particularly the development of Environmental Water Reserves. In doing so consideration should be given to Phillip Fox's (2005) 'Recommendations for Legislative Implementation of the White Paper's Proposed Reform'.

9.13 Criterion 13—Organisational roles and responsibilities

107. Generally there are clear distinctions between organisation's roles and responsibilities for the management of the health of the Goulburn River. However the agency responsibilities for protecting the health of native fish are not clear.

Clarify the roles of and responsibilities of government agencies for protecting the health of native and exotic fish populations.

108. Under the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995, G-MW is the authority (the holder of the bulk entitlement), the storage operator and the resource manager.

Consider separating the Bulk Entitlement (Eildon-Goulburn Weir) Conservation Order resource manager responsibilities from operational responsibilities.

Additional findings on organisational rules and responsibilities are presented in the findings on other audit criteria.

9.14 Criteria 14—Fish kill response arrangements

109. About three fish kill events each year have been recorded within the Goulburn Broken catchment since 1997. Over half of these events have occurred in summer.

110. It is not possible to draw any conclusions as to whether the fish kills within the catchment over the past decade are an indicator of declining river health as there is not a consistent historical trend.

111. It is not possible to determine whether the current frequency and severity of fish kills has changed significantly compared to pre-regulation conditions.

112. There is a broad range of fish kill causes without any one cause dominating.

113. The available monitoring records and data are insufficient to identify the environmental conditions that contributed to the January 2004 fish kill event downstream of the Goulburn Weir.

114. Several current response protocols have been refined by knowledge gained from the January 2004 fish kill

115. While agency roles and responsibilities for emergencies involving fish kills are identified in the *Emergency Management Act 1986* they not clearly articulated in all plans and protocols for such emergencies, or plans and protocols for fish kills that are not classified as emergencies (i.e. due to natural disease or drought conditions). In some cases agencies are not in full agreement on their respective responsibilities.

116. The EPA's Interim Fish Kill Protocol has been revised as a result of learnings from the January 2004 fish kill event. It still requires a process to upgrade the fish kill knowledge base which is necessary to inform future revisions to response protocols based upon minimising the incidence and severity of fish kills.

117. The current response protocols do not detail the necessary information and evidence to be collected prior to, during, and after the fish kill to identify the cause. These protocols can be improved to supplementing them with advice on where to take samples in and below storages, and to extend the water quality analysis to nutrients, metals and biocides when these are considered to be indicators of the likely cause of the fish kill event. Consideration could be given to prioritising the analytical program (e.g. temperature and DO analysed immediately).
118. Sound guidance on the possible causal factors of fish kill events in the reporting of fish kill events is not provided in any of the existing protocols.
119. Although the EPA's Interim Fish Kill Protocol provides a debrief process, it does not provide a process for review, follow up of actions, and refinement of management in order to reduce or eliminate the likelihood of the incidence and severity of future fish kills.
120. There is a lack of a robust State-based fish kill response protocol that is accepted and endorsed by all relevant agencies. This has caused, and continues to cause, significant frustration to most agencies involved in responding to fish kills.

Develop a robust State-based fish kill response protocol that has the support of all agencies and builds upon the EPA's Interim Fish Kill Protocol. Aspects of the Interim Fish Kill Protocol which would need further development to create a robust State-based protocol are:

- **clearly identify agencies' responsibilities**
- **specify the training requirements for relevant officers across all agencies**
- **specify mechanisms to review river health information following a fish kill**
- **specify a process to upgrade the fish kill knowledge base**
- **specify sample location advice, and nutrient, metals, and biocide sampling and analysis needs**
- **specify a process for review, follow up of actions, and refinement of management in order to reduce or eliminate the likelihood of the incidence and severity of future fish kills**
- **specify that the EPA, as chair of debrief sessions, should follow up after the debrief to facilitate and assist in the implementation of recommendations arising out of the debrief**
- **provide guidance on what possible causal factors (i.e. beyond the water body and the immediate tributaries) should be investigated in the reporting of the event. This should include dominant surrounding land uses; particularly industries and farming practices with high chemical inputs and use patterns, their proximity to waterways and potential for spray drift and run-off water to be carried into those waterways. The consideration should also include the cumulative impacts of multiple chemical uses in a general area**
- **specify central reporting requirements for fish deaths and greater notification arrangements between relevant agencies where agricultural chemicals are suspected**
- **specify independent sampling and laboratory analysis, where practicable, of water and biota with interagency consultation on the analytes to be tested where agricultural chemicals are suspected**

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- **incorporate relevant elements of the DPI Fish Kill Emergency Management Plan.**

121. The on-ground management arrangements of the draft Interim Framework for a Multi Agency Response to Incidents in Waterways in the Goulburn Broken Catchment (Part 3) are consistent with those documented in the draft working document of the Environmental Incident Management Response Arrangements for Victorian Waterways.

Refine the draft Interim Framework for a Multi Agency Response to Incidents in Waterways in the Goulburn Broken Catchment to ensure that it reflects the state-based protocols. (This could be a regionally-based model for other CMA regions within the State.)

122. The current agency and multi-agency fish kill response protocols are, in part, overlapping and inconsistent. For example as the EPA's Interim Fish Kill Protocol and DPI's Draft Fish Deaths Emergency Management Plan are internal documents there is duplication of some responsibilities and activities.

Refine the current agency-based protocols to ensure they reflect the state-based protocols and:

- (i) incorporate advice on where to take samples in and below storages**
- (ii) extend the water quality analysis to nutrients, metals and biocides when these are considered to be indicators of the likely cause of the fish kill event**
- (iii) include directions on appropriate collection of samples and specimens for subsequent pathology testing**
- (iv) clarify who pays for the fish kill response (where possible this should be based upon the polluter pays principle).**

123. Most relevant EPA, DPI and G-MW staff are trained and equipped to undertake their assigned roles under their respective fish kill protocols. The level of awareness by senior agency staff of their roles and responsibilities in the management of fish kill events has increased substantially since the January 2004 fish kill.

9.15 Criterion 15—WoV—Chemical management

124. G-MW does not store aquatic herbicides in or near surface waters, drainage lines or floodplains. All nine storage sites are at least 200 m away from surface waters and irrigation drainage lines.

125. G-MW has developed and maintained manuals and guidelines which address aspects of the storage, transport and use of biocides.

126. G-MW's Herbicide Operating Instructions Manual:

- outlines the duties of personnel, cleaning of equipment, usage reports, aquatic weed control, safety and safety equipment, and emergency response
- covers the storage of herbicides but not the transport as, apart from acrolein, G-MW advises that the chemicals it uses are not classified as dangerous goods
- advises that herbicides can only be applied based upon the conditions specified on the Product Label or the Minor Use Permits Issued by the Agricultural Products and Veterinary Medicines Association (APVMA).

Revise G-MW's Herbicide Operating Instructions Manual to include procedures for the transport of biocides.

127. The emergency response procedures documented in the Herbicide Operating Instructions Manual are limited to the herbicide label, the MSDS, and the safe storage and handling information provided by the G-MW's Aquatic Plant Services (APS). The safe storage and handling information is kept in the storage building and made available to spray operators.
128. Contingency planning and emergency response to spills are documented in G-MW's EMS Corporate Environmental Emergency Management Manual. The Acrolein Emergency Procedure Guide also has procedures for contingency planning and emergency response to spills.
129. G-MW's contingency plans for emergency holding and clean up measures, methods for disposal of spilled materials and staff training in operating and emergency response procedures are documented in G-MW's EMS Corporate Environmental Emergency Management Manual.
130. DPI's advice that 'G-MW staff appear to be adequately trained to carry out their weed spraying activities' is accepted on the basis that DPI Chemical Standards Branch audited G-MW's record keeping, restricted chemical use and APVMA off-label permit use of biocides in June 2004. During the DPI audit G-MW APS staff were interviewed to determine their level of relevant knowledge.
131. The Auditor has been advised that there have been several instances in which EPA has not provided guidance on herbicide usage despite requests by G-MW, and that the EPA has not commented on usage guidelines proposed by G-MW despite the request of G-MW.

Review internal arrangements for providing advice to stakeholders on the use of herbicides near water bodies.

132. EPA sits on a reference committee to develop Victorian management guidelines for the use of herbicides on riparian land. The guidelines address use but not the storage of biocides in or near surface waters. The EPA also offers guidance upon request. It is currently working with the fertiliser industry to support the rollout of their Fertcare program.

Distribute and promote the Victorian management guidelines for the use of herbicides on riparian land to all relevant stakeholders as soon as they become available.

Promote information exchange between agencies on agricultural chemicals and the potential environmental impacts. This could then lead to reducing the risk to the environment and a greater understanding of the type of analysis required in the event of any fish deaths where agricultural chemicals are suspected.

9.16 Criterion 16—Agricultural and Veterinary Chemicals (Control of Use) Act

133. G-MW has obtained APVMA permits to allow for the use of glyphosate and 2,4-D amitrole at a rate that is higher than the maximum application as stated on the label.
134. Some permit requirements had not been fully complied with (e.g. the start and finish spraying dates were not always met).

Ensure the training program for G-MW's Aquatic Plant Service licensed officers explicitly and clearly documents APVMA off-label reporting requirements.

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Conduct independent audits of G-MW's use of herbicides in channels, drains and other waters, in particular acrolein (Magnacide H) and chemicals used under APVMA off-label permits.

135. There are a limited number of native fish deaths in channels as a result of spraying as it occurs when the channels are dry, apart from some deeper pockets, and Fisheries Victoria are notified and asked if they wish to relocate fish when they are identified prior to spraying.

Obtain independent advice to determine whether approval is required for the existing channel and drain spraying under the EPBC Act. Approval is required for an action that has, will have, or is likely to have a significant impact upon matters of national significance.

136. G-MW now sprays channel and drain beds only (i.e. the batter is not sprayed) and on an as-required basis.

Continue the current practice of spraying irrigation channel and drain beds only and on an as-required basis with possible changes to the dosage rates to suppress rather than kill weeds.

137. The G-MW estimates of residual herbicide concentrations in drains and channels are dependent upon the assumption that 20% of the herbicide enters the water as run-off.
138. The glyphosate mean annual herbicide concentrations in both the Central Goulburn and the Shepparton Irrigation Areas is less than the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) herbicide trigger values for irrigation waters, aquatic ecosystems, and drinking water.
139. The amitrole mean annual concentration in the Central Goulburn Irrigation Area of 0.00226 mg/L is above the Australian Drinking Water Guideline trigger value of 0.001 mg/L. Channels are rarely used for drinking supply purposes. G-MW is understood to give prior notice to urban water authorities if they are to use biocides in channels and it is understood that the authorities then forgo diversion for a number of days. (This has not been audited.)
140. The estimated residual concentrations are mean annual rather than peak or seasonal estimates; hence are likely to be underestimates of peak concentrations. This will be offset by biological degradation as this process is not considered in the estimate.

Recalculate residual herbicide concentration estimates in channels and drains to account for peak concentrations and biodegradation processes and to include 2,4-D amine as well as amitrole and glyphosate. This should also include determining the proportion of the herbicide that ends up at the drain outlet as run-off. These calculations should be verified with in situ measurements. If ANZECC (2000) criteria are exceeded or likely to be exceeded, a contingency plan should be implemented. (If not already in place the contingency plan should be developed as a matter of urgency.)

141. G-MW recognise that concentrations of biocides in surface waters are likely to occur in short duration spikes which are difficult to detect in a spot sampling program. As many biocides bind to suspended sediments, sampling of bed sediments generally provides a better assessment of biocide contamination on a region-wide scale. Identification of high contamination levels in the sediments should lead to a targeted water quality monitoring program.

9.17 Criterion 17—Irrigation drains and channels

142. G-MW has conducted and reported on trials to minimise pollutants generated within irrigation drains and their impact on receiving waters.

Determine whether improved drain management practices have been applied to the Rodney Main Drain and Shepparton Drain 3. These include spraying and desilting on the drain bed only.

143. G-MW has advised that hydromulching has been initiated in targeted areas along new drains, and that spraying and desilting on drain batters is not currently practiced.
144. G-MW routinely monitors public drain flows, salinity, nutrients, DO, and suspended solids from the same regular sites which incorporate at least 87% of the irrigation area that is currently provided with surface drainage. This routine monitoring does not include outfalls that are serving irrigation areas of less than 5 000 ha or community drains.
145. The area of the irrigation drainage system that outfalls to the Goulburn River will increase by 44% over the next 20 years as the SIR Surface Water Management Strategy is fully implemented. This has the potential to increase contaminant loads to the Goulburn River.
146. The Water Quality Strategy targets a 50% reduction in the 1993/94 total phosphorus load from irrigation drains by 2016. Based upon phosphorus load estimates from the early 2000s the CMA is on track to achieve the 50% reduction target. Further monitoring and assessment is required to provide a level of confidence that this trend will continue taking the proposed increase in drained area and climatic conditions into account.

Conduct annual reporting of drain outfall nutrient loads as total loads and loads/km (and/or load/ha) of drain. This will assist in determining whether the WQS total phosphorus reduction target can be achieved while the drain network is expanding.

147. G-MW has undertaken extensive non-routine monitoring of pathogens, biocides, metals, and biological indicators in drainage waters to determine their potential impact on receiving waters.

Develop a co-ordinated and prioritised monitoring program for pathogens, biocides, metals, and biological indicators in drainage water and sediments. This should build upon the outcomes and recommendations of risk assessments, including the first tier assessment of biocides, and previous reports of non-routine drain monitoring conducted over the past five years. Consideration should be given to the sampling and analysis of the herbicides used by G-MW to control weeds in channels and drains as well as insecticides and fungicides. This task is generally consistent with the IDMoU Implementation Action Item 6b—‘Setting of Monitoring Requirements using Initial Rapid Decision Support System’.

Assess the implications and risks to river health of non-compliance of drain pathogen concentrations against the EPA (1996) Guidelines for Wastewater Reuse (Publication No. 464) and the ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

148. G-MW works with DSE, the EPA and the CMA to identify a credible, independent audit system and uses it to audit the impact of irrigation drain discharges on surface waters.
149. The IDMoU identifies a credible, independent audit system. The system could be improved by clarifying the trigger for undertaking a Special Catchment Analysis

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Improve the IDMoU audit system by clarifying the trigger for undertaking a Special Catchment Analysis.

150. G-MW conducted a first tier risk assessment of the risks associated with pesticides used in Goulburn-Murray irrigation areas in 2003. The assessment did not focus on drains as a pathway for pesticides to be transported to streams.

Extend the first tier assessment of the risks associated with pesticides used in Goulburn-Murray irrigation areas to include an assessment of the risk to beneficial uses associated with herbicide spraying of drains and channel outfalls.

9.18 Criterion 18—Irrigation Drainage Memorandum of Understanding

151. The Auditor is not aware of significant progress on task 2 (Development of detailed guidelines for reviews and reporting processes based on DSE principles) of the IDMoU's Implementation Schedule.
152. The development of existing water quality incident reporting and management procedures and systems (task 3 of the IDMoU Implementation Schedule) is underway.
153. The Auditor is not aware of significant progress on task 5 (Document assumed cause and effect relationships between resource condition outcomes and management actions).
154. The development of the initial rapid decision support system (task 6a) has commenced.

Revise the Implementation Work Program to complete the general issues and short-term initial rapid response processes by October 2005.

155. While the reporting date for annual reports has not been specified, it is expected to be in June each year (based upon a commencement date of June 2004). It is anticipated that resources are available to prepare these reports as much of this reporting is currently undertaken.
156. Although DPI is required to work with agencies to minimise pollutants entering irrigation drains under Clause 51(1) of the SEPP (WoV) it is not a signatory to the IDMoU. As a service provider to DSE and the Goulburn Broken CMA, DPI has farm extension and research commitments in drained irrigation catchments and is responsible for the implementation of privately owned regional surface water management systems identified under regional Lands and Water Management Plans.

Encourage DPI to become a signatory to the IDMoU as it has responsibilities under Clause 51(1) of the SEPP (WoV) to work with agencies to minimise pollutants entering irrigation drains and, as a service provider, it has farm extension and research commitments in drained irrigation catchments and is responsible for the implementation of privately owned regional surface water management systems identified under regional Lands and Water Management Plans.

9.19 Disease to native and introduced fish populations

157. The risk of disease and parasites to native fish and desirable alien fish species is a serious problem that can emerge from fish stocking or aquaculture enterprises. Both exotic and endemic disease outbreaks have potentially devastating effects on native and introduced fish. This has not been addressed through the audit, although it is acknowledged that Fisheries Victoria have developed management arrangements to prevent translocation for fish farms in the upper- and mid-Goulburn.

10 CONCLUSIONS

The conclusions of the environmental audit of the Goulburn River are presented in this Section of the report for each of the four audited activities.

10.1 Conclusions with level of conformance

Criterion 1—Environmental quality objectives and indicators

SEPP (WoV) environmental water quality objectives and indicators are being met for all beneficial uses to be protected.

Limited conformance

There is also confusion due to the uncertainty as to the beneficial uses (including native fish and salmonids) to be protected.

Criterion 2—Attainment program

A framework is in place to develop an Attainment Program for the Goulburn River and that it has been used and appropriately applied.

Partial conformance

This criterion has been partially met as the draft RRHS:

- provides a partial framework for the development of an Attainment Program (conformance)
- would require refinement to meet all Attainment Program framework needs (non-conformance).

The draft RRHS has yet to be endorsed by Government.

Criterion 3—Catchment management authorities

The Goulburn Broken CMA has worked with stakeholders to develop a Government approved RCS and plans, which identify the regional environmental, social and economic values of surface waters and, after careful consideration of environmental, social and economic needs, set appropriate goals, priorities and environmental targets for the catchment.

Partial conformance

This criterion has been partially met as:

- the Goulburn Broken CMA has worked with stakeholders to develop a Government approved RCS and Government approved plans (conformance)
- the draft RRHS identifies the river's environmental, social and economic assets (conformance)
- social and economic needs have not been adequately considered in setting appropriate goals, priorities and environmental targets for the river (non-conformance).

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Criterion 4—Regional target setting

Consistency of the RCS and supporting plans with regional target setting obligations under Clause 24 of the SEPP (WoV).

Partial conformance

Criterion 5—Water allocations and environmental flows

Compliance with obligations under Clause 41 of the SEPP (WoV)—Water Allocations and Environmental Flows—either by being met or being in the process of being met.

Partial conformance

The obligations under Clause 41 of the SEPP (WoV)—Water Allocations and Environmental Flows—are being met or are in the process of being met with the exception that a program to review and audit the provisions of environmental flows and their effectiveness in protecting beneficial uses has not been prepared. (The White Paper and the VRHS sets the framework for the review and audit process.)

Criterion 6—Thermal water quality objectives

Compliance with obligations for controlling water temperature, if any exist, in the Goulburn River below Lake Eildon and above Lake Nagambie.

Not applicable

This criterion cannot be evaluated for conformance as, although the Goulburn Eildon Fisheries Management Plan has specific objectives which involve the management of the river along audit reach 1 for specific species which are temperature dependent for their health, there are no thermal objectives and the CMA is yet to establish clear management objectives for this reach of the river through the RRHS.

Table 9.10 of the May 2005 draft RRHS describes the process for establishing clear management objectives for this reach of the river which will provide direction for resolution of major widespread issues, particularly the migration of native fish upstream of Goulburn Weir, changes to the flow regime, and reduced water temperatures.

Criterion 7—Other river health objectives and targets

Consistency of Goulburn Broken RCS and the draft RRHS with overarching river health strategies and plans; particularly objectives and targets.

General conformance

Non-conformances are:

- the RCS and supporting plans do not have a process in place to monitor and audit native fish populations
- monitoring programs are not in place to determine the condition of Murray cod, Silver perch, Macquarie perch and other protected and endangered species.

Criterion 8—Water Act—Environmental management obligations

Compliance with environmental management obligations under the *Water Act*.

General conformance

DSE, G-MW and the Goulburn Broken CMA are meeting their environmental management obligations under the *Water Act 1989* sections discussed above.

G-MW meets its *Water Act* s. 221 drainage obligations through the co-operative development and implementation of the Goulburn Broken Surface Water Management Strategy and through its participation, as a signatory, in the 2004 IDMoU.

Criterion 9—Bulk water entitlements and agreements

Compliance with environment related obligations under Bulk Water Entitlements and Water Supply Agreements.

General conformance

Conformances are:

- G-MW complies with the 'Minimum passing flow' requirements of the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995.
- GVRWAs annual diversion are below the Bulk Entitlement (Shepparton) Conversion Order 1995 limits.
- Southern Hydro and Pacific Hydro can only release water when authorised by G-MW.

Non-conformances are:

- Lack of clarity about how the Resource Manager's powers and responsibilities are being administered by the Minister or his delegate.
- Three dates identified by the Auditor out of 57 from January 2000 to September 2004 when flows were below the limit of 120 ML/d based on an independent check of information using available flow data. This information is inconsistent with the dates contained in the Goulburn Resource Manager Reports when flows were recorded below the limit of 120 ML/d.
- No formal approval of the Environmental Program by the Minister.
- Within the Goulburn Resource Manager reports there is minimal information on the environmental aspects listed in Clause 15.1 apart from flow records. For this reason it is not possible to confirm compliance with the Environmental Program.

Criterion 10—G-MW operational licence

G-MW compliance with obligations under a State Government Operational Licence, if it exists, as it relates to the environmental health of the Goulburn River.

Not applicable

G-MW does not have an operational licence with the Government.

Criterion 11—Other Acts relevant to river health

Identify whether key obligations relevant to the protection of endangered species, river water quality and the control of riparian land along the Goulburn River under Acts of Parliament are being met.

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General conformance

Obligations relevant to the protection of endangered species, river water quality and the control of riparian land along the Goulburn River under the following Acts of Parliament are being met:

- Catchment and Land Protection Act
- Environment Protection and Biodiversity Conservation Act.

Obligations relevant to the protection of endangered species, river water quality and the control of riparian land along the Goulburn River under the *Flora and Fauna Guarantee Act* and the *Heritage Rivers Act* have been met with the exception that the Auditor has not inspected a management plan for the Goulburn River Heritage Area.

Criterion 12—Legislation, Policies and Strategies

Consistency between legislation, policies and strategies in regard to the health of the Goulburn River.

Not applicable

It is not possible, or of assistance, to draw a conclusion as to the consistency between legislation, policies and strategies in regard to the health of the Goulburn River as the assessment has not been, nor can it be, comprehensive. It is more appropriate to put forward recommendations based upon the specific findings.

Criterion 13—Organisational roles and responsibilities

Consistency between organisational roles and responsibilities relevant to the health of the Goulburn River.

Substantial conformance

Criteria 14a and 14b—Fish kill response arrangements

14a: The occurrence of fish kills in the Goulburn River is increasing.

Unknown conformance

Fish kills in the Goulburn River system (river, tributary streams, drains and channels) have predominantly occurred in late spring and summer downstream of the Goulburn Weir. It is not possible to determine whether there is a historical trend in the frequency of fish kill events in the Goulburn River system.

14 b: The current response arrangements for managing Goulburn River fish kill events are adequate.

Partial conformance

The non-conformances are:

- DSE, Parks Victoria, and the DHS responsibilities are not clearly identified.
- The level of awareness of relevant staff from some agencies of the Fish Kill Protocols could be improved.
- There are limited mechanisms to review river health information to identify the environmental conditions that contributed to the fish kill.

- The Interim Fish Kill Protocol does not establish a process to upgrade the fish kill knowledge base which is necessary to inform future revisions to response protocols based upon minimising the incidence and severity of fish kills.
- The current response protocols may not provide for sufficient information and evidence to be collected, prior to, during, and after the fish kill to identify the cause.
- The current response protocols do not provide a process for review, follow up of actions, and refinement of management in order to reduce or eliminate the likelihood of the incidence and severity of future fish kills.

Criterion 15—WoV—Chemical management

Conformance with the biocides storage, training, use, contingency planning and emergency response obligations of Clause 37 of the SEPP (WoV).

Substantial conformance

The non-conformances are (i) the Herbicide Operating Instructions Manual does not cover the storage and transport of biocides; and (ii) the EPA has not developed or assisted in the guidelines for the storage of biocides in or near surface waters. (The EPA has assisted in the development of guidelines for the use of biocides in or near surface waters.)

Criterion 16—Agricultural and Veterinary Chemicals (Control of Use) Act

Conformance with Agricultural and Veterinary Chemicals (Control of Use) Act as it relates to herbicide application rates in G-MW channels and drains.

General conformance

The non-conformance is incomplete compliance with all APVMA off-label permit requirements.

Criterion 17—Irrigation drains and channels

Conformance with Clause 51(2) of the SEPP (WoV)—Irrigation Channels and Drains

Partial conformance

A prioritisation system for non routine drain monitoring has not been developed, and DPI needs to be encouraged to become a signatory to the IDMoU.

Criterion 18—Irrigation Drainage Memorandum of Understanding

Conformance with the IDMoU.

Partial conformance

The IDMoU Implementation Work Program is behind schedule for some tasks.

10.2 Statement of conformance and primary evidence sources

The statement of conformance of the audited activity against each of all criteria is presented in Table 10.1.

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Table 10.1: Level of activity conformance with audit criteria

No	Criteria	Conformance
1	SEPP (WoV) environmental water quality objectives and indicators are being met for all beneficial uses to be protected.	Limited
2	A framework is in place to develop an Attainment Program for the Goulburn River and that it has been used and appropriately applied.	Partial
3	The Goulburn Broken CMA has worked with stakeholders to develop a Government approved RCS and plans, which identify the regional environmental, social and economic values of surface waters and, after careful consideration of environmental, social and economic needs, set appropriate goals, priorities and environmental targets for the catchment.	Partial
4	Consistency of the RCS and supporting plans with regional target setting obligations under Clause 24 of the SEPP (WoV).	Partial
5	Compliance with obligations under Clause 41 of the SEPP (WoV)—Water Allocations and Environmental Flows—either by being met or being in the process of being met.	Partial
6	Compliance with obligations for controlling water temperature, if any exist, in the Goulburn River below Lake Eildon and above Lake Nagambie.	Not applicable
7	Consistency of RCS and the draft RHHS with overarching river health strategies and plans; particularly objectives and targets.	Generally
8	Compliance with Environmental Management Obligations under the <i>Water Act</i> .	Generally
9	Compliance with Environment Related Obligations under Bulk Water Entitlements and Water Supply Agreements.	Generally
10	G-MW compliance with obligations under a State Government Operational Licence, if it exists, as it relates to the environmental health of the Goulburn River.	Not applicable
11	Identify whether key obligations relevant to the protection of endangered species, river water quality and the control of riparian land along the Goulburn River under Acts of Parliament are being met.	Generally
12	Consistency of between legislation, policies and strategies in regard to the health of the Goulburn River.	Not applicable
13	Consistency between organisational roles and responsibilities relevant to the management of the health of the Goulburn River.	Substantial
14	The occurrence of fish kills in the Goulburn River is increasing (14a). The current response arrangements for managing Goulburn River fish kill events are adequate (14b).	Unknown Partial
15	Conformance with the biocides management obligations under Clause 37 of the SEPP (WoV).	Substantial
16	Conformance with the <i>Agricultural and Veterinary Chemicals (Control of Use) Act</i> as it relates to herbicide application rates in G-MW channels and drains.	Generally
17	Conformance with Clause 51(2) of the SEPP (WoV)—Irrigation Channels and Drains.	Partial
18	Conformance with the Irrigation Drainage Memorandum of Understanding Implementation Work Program.	Partial

11 RECOMMENDATIONS

All recommendations presented within the audit findings in Section 9 have been designated a priority based upon the potential risks of harm to the health of the Goulburn River if the recommendation is not adopted in the medium term.

11.1 Priority Ratings Classification

The priority rating classifications are:

- extreme (E)
- very high (VH)
- high (H)
- medium (M)
- low (L)

The methodology used to rate the risks is presented in Appendix D together with the full results of the risk assessment. Suggested agency responsibilities for implementation have been assigned to each recommendation.

All recommendations are presented in Tables 11.1 to 11.4 in accordance to their priority. No 'extreme' priorities were identified.

11.2 High priority recommendations

The very high and high priority recommendations are summarised below.

State Environment Protection Policy (Waters of Victoria)

Establish an integrated routine water quality monitoring evaluation and reporting program which can be used to determine whether the endorsed Goulburn Broken Regional River Health Strategy (RRHS) and the SEPP (WoV) Attainment Program targets are being met.

Investigate the cause of the low dissolved oxygen below Lake Eildon between July 2002 and June 2003.

Address the potential environmental threats to the health of Lake Nagambie and the Goulburn weir pool and establish permanent water quality monitoring stations within these water bodies.

Assess whether summer and late spring releases from the Goulburn Weir's vertical lift gates will increase downstream dissolved oxygen levels and are technically feasible for short-term periods. If so, consider releases from the vertical lift gates when the dissolved oxygen falls below agreed trigger levels to reduce the risk of fish kills.

Establish a SEPP (WoV) Attainment Program for the Goulburn River between Lake Eildon and the Murray River including the Goulburn weir pool and Lake Nagambie.

Goulburn Broken Regional River Health Strategy

Finalise the RRHS and develop a linked SEPP (WoV) Attainment Program after taking full account of the social and economic needs as well as environmental risk aspects for all audit reaches.

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Update the short-term RCTs and MATs for audit reaches 1, 2 and 3 once clear management objectives are established and review existing targets for audit reach 4.

Ensure that the RRHS aspirational targets, RCTs and MATs for native and exotic fish are considered in the development of the Goulburn River's Environmental Water Reserve.

Water allocations and environmental flows

Complete the identification of Environmental Water Reserves requirements for the Goulburn River.

Ensure that the Environmental Water Reserve requirements are consistent with the negotiated flow regime arising out of the completion of the RRHS's environmental flow program and the RRHS aspirational targets, RCTs and MATs for all Goulburn River reaches.

Seek clarification as to the best way forward to resolve the likely inconsistency between the SEPP (WoV) Clause 41 'Water Allocations and Environmental Flows' and Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995 as it relates to G-MWs ability to implement measures to provide environmental flows.

Reform the *Water Act 1989* as soon as practical to allow for the effective establishment of Environmental Water Reserves. In doing so consideration should be given to Phillip Fox's (2005) 'Recommendations for Legislative Implementation of the White Paper's Proposed Reform'.

Thermal water quality objectives

Determine G-MW obligations under its EMS to reduce the risk of temperature fluctuations below Lake Eildon on flora, fauna, loss of habitat and loss of amenity.

Consider closer integration of the Goulburn Eildon Fishery Management Plan with the RRHS to ensure that the RCT targets of both strategies are consistent and are developed through the same stakeholder consultation process.

In the development of long-term RRHS RCTs and MATs for audit reach 1, consider the social and economic, as well as the environmental, impacts of providing for warmer water releases from Lake Eildon and the inability to provide an optimal temperature regime for both native fish and desirable introduced species.

Goulburn Weir Pool and Lake Nagambie

Consider the viability of constructing a fish ladder at the Goulburn weir having regard to the outcomes of the feasibility study. The viability should be considered in consultation with relevant stakeholders including local angling committees.

Obtain an improved understanding of ecological processes within the Nagambie Lakes system. This should be achieved by addressing the knowledge gaps identified in the 2002 assessment by the scientific expert panel.

Management of Bulk Water Entitlements

Revise the Bulk Entitlement to ensure that the environmental obligations for managing the Environmental Water Reserve are clear, transparent and auditable.

Continue to amend the Bulk Entitlement as each water saving measure is identified and implemented and the Environmental Water Reserve is established.

Threatened Species and Threatening Processes

Complete FFG Action Statements for all threatened species and threatening processes that are relevant to the Goulburn River below Lake Eildon.

As Action Statements are completed review and update the RRHS to ensure that it is consistent.

Responsibility for the protection of fish

Clarify the roles of and responsibilities of government agencies for protecting the health of native and exotic fish populations.

Fish kill response arrangements

Develop a robust State-based fish kill response protocol that has the support of all agencies and builds upon the EPA's Interim Fish Kill Protocol.

Refine the draft Interim Framework for a Multi Agency Response to Incidents in Waterways in the Goulburn Broken Catchment to ensure that it reflects the state-based protocols. (This could be a regionally-based model for other CMA regions within the State.)

Refine the current agency-based fish kill response protocols to ensure they reflect the recommended state-based protocols.

Biocides usage

Review EPA arrangements for providing advice to stakeholders on the use of herbicides near water bodies.

Promote information exchange between agencies on agricultural chemicals and the potential environmental impacts.

Conduct independent audits of G-MW's use of herbicides in channels, drains and other waters, in particular acrolein (Magnacide H) and chemicals used under APVMA off-label permits.

Recalculate residual herbicide concentration estimates in channels and drains to account for peak concentrations and biodegradation processes and to include 2,4-D amine as well as amitrole and glyphosate. This should also include determining the proportion of the herbicide that ends up at the drain outlet as run-off. These calculations should be verified with in situ measurements. If ANZECC (2000) criteria are exceeded or likely to be exceeded, a contingency plan should be implemented.

Irrigation drains and channels

Develop a co-ordinated and prioritised monitoring program for pathogens, biocides, metals, and biological indicators in drainage water and sediments. This should build upon the outcomes and recommendations of risk assessments, including the first tier assessment of biocides, and previous reports of non-routine drain monitoring conducted over the past five years.

Extend the first tier assessment of the risks associated with pesticides used in Goulburn-Murray irrigation areas to include an assessment of the risk to beneficial uses associated with herbicide spraying of drains and channel outfalls.

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11.3 Prioritised recommendations with responsibilities

All recommendations are presented in Table 11.1 together with the criterion and finding that they are associated with as well as the suggested responsibility and priority.

Table 11.1: Prioritised Goulburn River audit recommendations

Criterion	Finding	Recommendation	Responsibility	Priority
1	2	Investigate the cause of the low dissolved oxygen in audit reach 1 between July 2002 and June 2003.	CMA G-MW	H
1	3	Establish permanent water quality monitoring stations within audit reaches 2 and 3.	CMA	H
1	4	Address the potential environmental threats to the health of Lake Nagambie and the Goulburn weir pool (audit reaches 2 and 3) which were identified in the expert panel's 2002 ecological review.	CMA G-MW	VH
1	6	Assess whether summer and late spring releases from the Goulburn Weir's vertical lift gates will increase downstream dissolved oxygen levels and are technically feasible for short-term periods. (Technical issues include management of occupational health and safety risks and accurate flow monitoring.) If so, consider releases from the vertical lift gates when the dissolved oxygen falls below agreed trigger levels to reduce the risk of fish kills.	CMA G-MW	H
1	9	Clarify, through the RRHS, whether and when the SEPP (WoV) water quality objectives will be met.	CMA	L
1	10	Establish stream management unit RCTs, through the RRHS, for all SEPP (WoV) water quality and biological environmental quality objectives. If these are to be subject to an additional ecological risk assessment process, establish and apply short-term targets until the ecological risk assessment is completed.	CMA	M
1	10	Establish an integrated routine water quality monitoring evaluation and reporting program which can be used to determine whether the endorsed RRHS and SEPP (WoV) Attainment Program targets are being met. The program should: <ul style="list-style-type: none"> <input type="checkbox"/> build upon existing monitoring programs and include ambient water quality monitoring <input type="checkbox"/> allow for the determination of whether releases from Lake Eildon and Goulburn Weir pose environmental risks to beneficial uses <input type="checkbox"/> include monitoring for turbidity, nutrients, temperature, dissolved oxygen and any other pollutants considered necessary. 	CMA DSE G-MW, GVRWA EPA	H

Criterion	Finding	Recommendation	Responsibility	Priority
2	14	Establish a SEPP (WoV) Attainment Program for the Goulburn River between Lake Eildon and the Murray River including the Goulburn weir pool and Lake Nagambie.	CMA EPA	H
2	17	Identify and endorse the appropriate vehicle(s) for the Goulburn River SEPP (WoV) Attainment Program. This could be the RRHS or a separate attainment program that is effectively linked to the RRHS.	DSE EPA	M
2	17	Recognise complementary regulatory instruments, strategies and plans that are required to meet relevant objectives of the endorsed Attainment Program vehicle(s).	All Agencies	L
2	17	Avoid duplication of river health target setting processes, by ensuring there are transparent linkages between relevant natural resource strategies and plans and the SEPP (WoV) Attainment Program.	All Agencies	M
3	21	Document the linkages between the beneficial uses and the assets within the RRHS.	CMA	L
3	23	Finalise the RRHS and develop a linked SEPP (WoV) Attainment Program after taking full account of the social and economic needs as well as environmental risk aspects for all audit reaches. This should be achieved through extensive stakeholder engagement and by using assessment tools such as Multi Criteria Assessment (utilising the outcomes of any additional water quality-related ecological risk assessment).	CMA EPA	VH
4	27	Update the short-term RCTs and MATs for audit reaches 1, 2 and 3 once clear management objectives are established and review existing targets for audit reach 4. These targets should: <ul style="list-style-type: none"> <input type="checkbox"/> reflect the SEPP (WoV) Clause 24 requirements for regional target setting <input type="checkbox"/> consider the 'Secondary Contact Recreational', 'Aquaculture', and 'Fish, Crustacea and Molluscs for Human Consumption' beneficial uses as they relate to both native and exotic fish <input type="checkbox"/> be based upon a full evaluation of the environment, social and economic impacts <input type="checkbox"/> consider key threats to the assets (i.e. significant point source discharges) <input type="checkbox"/> include thermal water quality targets and fish recruitment and survival.. 	CMA EPA	VH
4	30	Revise the Goulburn Broken RCS to ensure that it adopts all RRHS and sub-strategies RCTs and MATs and that other river health targets are removed.	CMA	L

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Criterion	Finding	Recommendation	Responsibility	Priority
5	39	Complete the identification of EWR requirements for the Goulburn River. These requirements should be consistent with the RRHS aspirational targets, RCTs and MATs along all stream management units including the yet to be established management objectives for audit reaches 1, 2 and 3.	DSE CMA	VH
5	42	Finalise the development of tool(s) to assess the effectiveness of environmental releases to Victorian streams. In developing the tool(s) consideration should be given to utilising the ISC, the RiVERS measures, and SEPP (WoV) water quality objectives as possible measures of the effectiveness. The national review of approaches to ecological responses to environmental flows monitoring being undertaken by the CRC for Freshwater Ecology should be considered in the development of the tool.	DSE	M
6	45	Determine G-MW obligations under its EMS to reduce the risk of temperature fluctuations below Lake Eildon on flora, fauna, loss of habitat and loss of amenity.	G-MW	H
6	47	Consider closer integration of the Goulburn Eildon Fishery Management Plan with the RRHS to ensure that the RCT targets of both strategies are consistent and are developed through the same stakeholder consultation process.	DPI DSE CMA	H
6	47	In the development of long-term RRHS RCTs and MATs for audit reach 1 consider the social and economic, as well as the environmental, impacts of providing for warmer water releases from Lake Eildon and the inability to provide an optimal temperature regime for both native and exotic fish.	CMA	H
7	51	Ensure that the RRHS process to monitor and audit native fish populations includes all threatened fish species. The monitoring program should obtain sufficient data to assess whether the RRHS fish related aspirational targets, RCTs and MATs are being met. The program should be implemented as soon as practicable.	CMA DSE DPI	M
7	51	Ensure that the RRHS aspirational targets, RCTs and MATs for native and exotic fish are considered in the development of the Goulburn River's environmental water reserve.	EPA CMA DSE	H
7	57	Consider the viability of constructing a fish ladder at the Goulburn weir having regard to the outcomes of the feasibility study. The viability should be considered in consultation with relevant stakeholders including local angling committees.	CMA G-MW	H
7	58	Review the current management arrangements for altering the level of the Goulburn weir pool and Lake Nagambie.	G-MW, CMA Angling assoc'ns	M

Criterion	Finding	Recommendation	Responsibility	Priority
7	58	Obtain an improved understanding of ecological processes within the Nagambie Lakes system (audit reaches 3 and 4). This should be achieved by addressing the knowledge gaps identified in the 2002 assessment by the scientific expert panel.	CMA G-MW Community Anglers	H
8	59	Consider declaring a perimeter buffer around the Goulburn weir pool as 'an environmental and recreational area' under s. 107 of the <i>Water Act</i> . This would provide a powerful mechanism to provide for effective multiple use management including the preservation of native flora and fauna and minimising the risk of contaminated water entering Lake Nagambie and the Goulburn weir pool.	G-MW	M
8	62	Consider whether to place performance and reporting conditions on new drain connections.	G-MW	M
9	78	Respond to G-MW's proposed program to manage the environmental effects of G-MW works as required under Clause 15.1 of the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order or suggest an alternative approach to meet these obligations. In doing so provide guidance to G-MW to assist the authority refine the Annual Goulburn Basin Water accounts reports to reflect all environmental reporting requirements under Cl. 15.1.	DSE	M
9	78	Revise the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order to ensure that the environmental obligations for managing the environmental water reserve are clear, transparent and auditable.	DSE	H
9	82	Clarify what constitutes a 'significant' breach of the Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order.	DSE	M
9	84	Continue to amend G-MW's BE Order as the Environmental Water Reserve is established through the water savings program. The Environmental Water Reserve should be consistent with the negotiated flow regime arising out of the completion of the RRHS's environmental flow program.	DSE	VH
11	89	Review processes for declaring noxious riparian weeds and ensure adequate resources are available to respond to emerging environmental and agricultural weeds.	DSE	M
11	92	Complete FFG Action Statements for all threatened species and threatening processes that are relevant to the Goulburn River below Lake Eildon.	DSE CMA	H
11	92	As Action Statements are completed review and update the RRHS to ensure that it is consistent.	DSE CMA	H
11	93	Ensure that all completed Action Statements for threatened species and potentially threatening processes are readily available to the public.	DSE	L

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Criterion	Finding	Recommendation	Responsibility	Priority
11	94	Ensure that the RRHS RCTs are linked with and reflect threatened species and threatening processes Action Plans relevant to the Goulburn River.	CMA	H
12	102	Seek clarification as to the best way forward to resolve the likely inconsistency between the SEPP (WoV) Clause 41 'Water Allocations and Environmental Flows' and Bulk Entitlement (Eildon-Goulburn Weir) Conversion Order 1995 as it relates to G-MW's ability to implement measures to provide environmental flows.	DSE CMA EPA	H
12	106	Reform the <i>Water Act</i> as soon as practical to allow for the effective implementation of the Victorian Government's White Paper 'Our Water Our Future', particularly the development of Environmental Water Reserves. In doing so consideration should be given to Phillip Fox's (2005) 'Recommendations for legislative implementation of the White Paper's proposed reform'.	DSE	VH
13	107	Clarify the roles of and responsibilities of government agencies for protecting the health of native and exotic fish populations.	CMA EPA DSE DPI	VH
13	108	Consider separating the Bulk Entitlement (Eildon-Goulburn Weir) Conservation Order resource manager responsibilities from operational responsibilities.	DSE	M

Criterion	Finding	Recommendation	Responsibility	Priority
14	120	<p>Develop a robust State-based fish kill response protocol that has the support of all agencies and builds upon the EPA's Interim Fish Kill Protocol. Aspects of the Interim Fish Kill Protocol which would need further development to create a robust State-based protocol are:</p> <ul style="list-style-type: none"> <input type="checkbox"/> clearly identify agencies' responsibilities <input type="checkbox"/> specify the training requirements for relevant officers across all agencies <input type="checkbox"/> specify mechanisms to review river health information following a fish kill <input type="checkbox"/> specify a process to upgrade the fish kill knowledge base <input type="checkbox"/> specify sample location advice, and nutrient, metals, and biocide sampling and analysis needs <input type="checkbox"/> specify a process for review, follow up of actions, and refinement of management in order to reduce or eliminate the likelihood of the incidence and severity of future fish kills <input type="checkbox"/> specify that the EPA, as chair of debrief sessions, should follow up after the debrief to facilitate and assist in the implementation of recommendations arising out of the debrief <input type="checkbox"/> provide guidance on what possible causal factors (i.e. beyond the water body and the immediate tributaries) should be investigated in the reporting of the event. This should include dominant surrounding land uses; particularly industries and farming practices with high chemical inputs and use patterns, their proximity to waterways and potential for spray drift and run-off water to be carried into those waterways. The consideration should also include the cumulative impacts of multiple chemical uses in a general area <input type="checkbox"/> specify central reporting requirements for fish deaths and greater notification arrangements between relevant agencies where agricultural chemicals are suspected <input type="checkbox"/> specify independent sampling and laboratory analysis, where practicable, of water and biota with interagency consultation on the analytes to be tested where agricultural chemicals are suspected <input type="checkbox"/> incorporate relevant elements of the DPI Fish Kill Emergency Management Plan. 	All relevant agencies	VH
14	121	Refine the draft Interim Framework for a Multi Agency Response to Incidents in Waterways in the Goulburn Broken Catchment to ensure that it reflects the state based protocols. (This could be a regionally based model for other CMA regions within the State.)	All agencies	H

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Criterion	Finding	Recommendation	Responsibility	Priority
14	122	<p>Refine the current agency-based protocols to ensure they reflect the state-based protocols and:</p> <ul style="list-style-type: none"> <input type="checkbox"/> incorporate advice on where to take samples in and below storages <input type="checkbox"/> extend the water quality analysis to nutrients, metals and biocides when these are considered to be indicators of the likely cause of the fish kill event <input type="checkbox"/> include directions on appropriate collection of samples and specimens for subsequent pathology testing <input type="checkbox"/> clarify who pays for the fish kill response (where possible this should be based upon the polluter pays principle). 	All agencies	H
15	126	Revise G-MW's Herbicide Operating Instructions Manual to include procedures for the transport of biocides.	G-MW	L
15	131	Review internal arrangements for providing advice to stakeholders on the use of herbicides near water bodies.	EPA	L
15	132	Distribute and promote the Victorian management guidelines for the use of herbicides on riparian land to all relevant stakeholders as soon as they become available.	EPA	M
15	125	Promote information exchange between agencies on agricultural chemicals and the potential environmental impacts. This could then lead to reducing the risk to the environment and a greater understanding of the type of analysis required in the event of any fish deaths where agricultural chemicals are suspected.	EPA DPI G-MW DSE	H
16	134	Ensure the training program for G-MW's Aquatic Plant Service licensed officers explicitly and clearly documents APVMA off-label reporting requirements.	G-MW	M
16	134	Conduct independent audits of G-MW's use of herbicides in channels, drains and other waters, in particular acrolein (Magnacide H) and chemicals used under APVMA off-label permits.	DPI, G-MW	H
16	135	Obtain independent advice to determine whether approval is required for the existing channel and drain spraying under the <i>EPBC Act</i> . Approval is required for an action that has, will have, or is likely to have a significant impact upon matters of national significance.	G-MW	M
16	136	Continue the current practice of spraying irrigation channel and drain beds only and on an as-required basis with possible changes to the dosage rates to suppress rather than kill weeds	G-MW	M

Criterion	Finding	Recommendation	Responsibility	Priority
16	140	Recalculate residual herbicide concentration estimates in channels and drains to account for peak concentrations and biodegradation processes and to include 2,4-D amine as well as amitrole and glyphosate. This should also include the determination of proportion of the herbicide that ends up at the drain outlet as run-off. These calculations should be verified with in situ measurements. If ANZECC (2000) criteria are exceeded or likely to be exceeded, a contingency plan should be implemented. (If not already in place the contingency plan should be developed as a matter of urgency.)	G-MW	H
17	142	Determine whether improved drain management practices have been applied to the Rodney Main Drain and Shepparton Drain 3. These include spraying and desilting on the drain bed only.	CMA	M
17	146	Conduct annual reporting of drain outfall nutrient loads as total loads and loads/km (and/or load/ha) of drain. This will assist in determining whether the WQS total phosphorus reduction target can be achieved while the drain network is expanding.	CMA G-MW EPA	M
17	147	Develop a co-ordinated and prioritised monitoring program for pathogens, biocides, metals, and biological indicators in drainage water and sediments. This should build upon the outcomes and recommendations of risk assessments, including the first tier assessment of biocides, and previous reports of non-routine drain monitoring conducted over the past five years. Consideration should be given to the sampling and analysis of the herbicides used by G-MW to control weeds in channels and drains as well as insecticides and fungicides. This task is generally consistent with the IDMoU Implementation Action Item 6b—'Setting of Monitoring Requirements using Initial Rapid Decision Support System'.	CMA G-MW EPA	VH
17	147	Assess the implications and risks to river health of non-compliance of drain pathogen concentrations against the EPA (1996) Guidelines for Wastewater Reuse (Publication No. 464) and the ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.	CMA EPA G-MW	M
17	149	Improve the IDMoU audit system by clarifying the trigger for undertaking a Special Catchment Analysis.	DSE	M
17	150	Extend the first tier assessment of the risks associated with pesticides used in Goulburn-Murray irrigation areas to include an assessment of the risk to beneficial uses associated with herbicide spraying of drains and channel outfalls.	CMA G-MW	H
18	154	Revise the Implementation Work Program to complete the general issues and short-term initial rapid response processes by October 2005.	DSE	M

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Criterion	Finding	Recommendation	Responsibility	Priority
18	156	Encourage DPI to become a signatory to the IDMoU as it has responsibilities under Clause 51(1) of the SEPP (WoV) to work with agencies to minimise pollutants entering irrigation drains and, as a service provider, it has farm extension and research commitments in drained irrigation catchments and is responsible for the implementation of privately owned regional surface water management systems identified under regional Lands and Water Management Plans.	DSE	L

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13 INITIALISMS

AIIMS	Australian Interservice Incident Management System
ANZECC	Australian and New Zealand Environment Conservation Council
APS	Aquatic Plant Services
APVMA	Agricultural Products and Veterinary Medicines Authority
ARI	Average Recurrence Interval
AROT	Australian Rare or Threatened
BE Order	Bulk Entitlement Order
BMP	Best Management Practice
CEEMP	Corporate Environmental Emergency Management Plan
CMA	Catchment Management Authority
CMPS&F	Camp Scott and Furphy
COAG	The Council of Australian Governments
CRC Freshwater Ecology	Co-operative Research Centre for Fresh Water Ecology
DEH	Department of Environment and Heritage
DHS	Department of Human Services
DISPLAN	State Disaster Plan
DNRE	Department of Natural Resources and Environment
DO	Dissolved Oxygen
DPI	Department of Primary Industries
Draft RRHS	Draft Goulburn Broken Regional River Health Strategy
DSE	Department of Sustainability and Environment
DSS	Decision Support System
EC	Electrical Conductivity
EHN	Epizootic Haematopoietic Necrosis
EHNV	Epizootic Haematopoietic Necrosis Virus
EMS	Environment Management System
EPA	Environment Protection Authority
EPBC	Environment Protection and Biodiversity Conservation Act 2000
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ERA	Ecological Risk Assessment
EV	Environment Victoria
EVC	Ecological Vegetation Class

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EWR	Environment Water Reserve
FCC	Fisheries Co-management Council
FFG Act	Flora and Fauna Guarantee Act 1988
FSL	Full Supply Level
GERFMP	Goulburn Eildon Region Fisheries Management Plan
GIS	Geographic Information System
GL	Gigalitre
GMID	Goulburn-Murray Irrigation District
G-MW	Goulburn-Murray Water
GVEG	Goulburn Valley Environmental Group
GVRWA	Goulburn Valley Regional Water Authority
ha	Hectare
IDMoU	Irrigation Drainage Memorandum of Understanding
ISC	Index of Stream Conditions
ISQG	Intern Sediment Quality Guidelines
km	Kilometre
KPI	Key Performance Indicators
LCC	Land Conservation Council
LWMS/P	Land and Water Management Strategies/Plans
MCT	Management Action Target
MDBC	Murray Darling Basin Commission
ML	Megalitre
MoU	Memorandum of Understanding
NFS	National Fish Strategy
NWQMS	National Water Quality Management Strategy
PI	Performance Indicator
RCS	Regional Catchment Strategy
RCT	Resource Condition Target
RRHS	Regional River Health Strategy
SEPP (WoV)	State Environment Protection Policy—Waters of Victoria
SIR	Shepparton Irrigation Region
SKM	Sinclair Knight Merz
SWMIP	Surface Water Management Implementation Plan
SWMS	Surface Water Management System
SWS	Sustainable Water Strategies
TBL	Triple Bottom Line

VIAS	Victorian Institute of Animal Science
VNMS	Victorian Nutrient Management Strategy
VRHS	Victorian River Health Strategy
VWQMN	Victorian Water Quality Monitoring Network
WQS	Water Quality Strategy
YYNAC	Yorta Yorta Nations Aboriginal Corporation

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14 ACKNOWLEDGEMENTS

The independent audit of the Goulburn River was requested by the Minister for the Environment and Water following the fish kill downstream of the Goulburn Weir in January 2004. The primary objective of the audit was to obtain the information and understanding required to guide the management of the Goulburn River towards providing a healthier river system.

In undertaking this independent audit, consultation has occurred with a broad range of stakeholders including governmental agencies, environmental groups, fish protection bodies, the Yorta Yorta Nation, recreational users, water users, landowners, and other interested organisations.

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