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Summary
This review is undertaken for National Land and Water Resources Audit (NLWRA) and the Department of Sustainability and Environment (DSE) to assess the effectiveness of the National Matters for Targets and indicator framework in the Catchment Management Authority (CMA) regions of Victoria. There is also a broader discussion of the contemporary issues and opportunities associated with implementing monitoring, evaluation and reporting (MER) at the regional level. MER in natural resource management (NRM) is considered here in the context of catchment condition, with a primary focus on monitoring and reporting.

Information for this review is harvested from NRM strategies and planning documents at regional, state and commonwealth jurisdictions, in addition to a suite of interviews conducted with CMA representatives.

The CMA respondents acknowledge the complexity of establishing a sustained and collaborative MER framework. The breadth, complexity and depth of inter-relationships within NRM guarantee that MER is challenging. There are few if any documented examples of fully integrated NRM MER approaches around the world. Planning and implementing a fully integrated NRM MER strategy remains an immature process, with few global examples that span the geography and biophysical disciplines that a CMA region is expected to oversee.

Matters for Targets and Indicators

**Catchment indicators and outcomes embraced**

- Most CMA Boards and senior management strongly support catchment indicators as they are now focused on trying to deliver outcomes. Boards themselves may not be conversant with Matters for Target (MFT) per se, typically being more tuned to the language of Resource Condition Targets (RCT). Project implementation staff whom may be more preoccupied with project outputs than MFT outcomes. Communication with partners on resource condition remains couched in the language of RCTs.

**Uncertainty and language of MFT**

- A significant number of CMAs mention that they have a level of uncertainty in understanding the MFT framework especially as it has not been adequately communicated. The cumbersome, bureaucratic language is also an issue. However, most CMAs have been able to cross-link the MFT framework to their existing regional catchment strategies.

**Difference in theory and application**

- There is reasonable satisfaction with the theoretical list of MFT indicators, but significant problems in applying a number of these, more particularly the soil condition MFT, estuarine and coastal MFT, significant native species/communities MFT and wetlands indicators. The lack of baseline data emerged as a ubiquitous issue for most of the MFTs, with a number of indicator methodological issues also raised.

**MFT reporting a conundrum**

- An underlying concern is the rationale behind the MFT Indicator Framework and the expected reporting requirements. Even more fundamental than this is the question of relevance of existing monitoring regimes to achieve the desired outcome(s). Specific guidelines as well as consistency in State and Commonwealth requirements are critical to a CMA effectively undertaking its catchment condition reporting responsibilities.
CMA regions and NRM MER

**NRM MER is evolving**
- Planning and implementing an NRM MER strategy remains an immature process. It is important that development of MER is seen as an evolving process, adapting to new information and new models of application. There is a broad spectrum of progress of CMAs striving to establish a formalised NRM MER capability.

**Cross-regional engagement is critical**
- The CMAs are separate independent bodies with a unique set of abilities, strengths and weaknesses. It is therefore important that there are engagement processes to allow information and perspectives to be shared between regions, and to minimize the duplication of effort.

**The need for engagement from and between the State and Commonwealth**
- For a CMA to undertake its NRM MER role effectively it needs to have the confidence that the State and the Commonwealth are aligned in their requirements wherever possible. Engagement with regions is important for developing a sense of ownership and commitment to what is required by government agencies.

**Innovation and leadership should be supported**
- A number of CMAs are already well-progressed with planning or implementing their NRM MER strategies and are in a position of leadership on the issue. This innovation and leadership ought to be harnessed.

**The challenge of CMAs and the separation of data**
- CMAs undertake little of the monitoring that they are ultimately expected to report upon in their catchment condition reporting. The separation in location of biophysical catchment data, the different institutional rules surrounding these and the varied requirements of information products make the CMA role a challenging one.

**Appreciating the roles of CMAs in data and information**
- There is a wide variation in views towards data management across the CMAs, this contributes to their uniqueness. However, some broader discussion of the exact role of CMAs in data and information management would be beneficial to avoid unnecessary duplication of effort and help plan data management.

**Need a framework for ‘aggregating’ catchment condition indicator information**
- The ability to aggregate information to satisfy different jurisdictional requirements is often mentioned as an aspiration in NRM MER, but the practical application of this needs further development. There needs to be recognition of the assumptions and trade-offs in this.

**Additional emphasis on the contexting and interpretation of catchment indicator data**
- Exploring and testing the assumptions between output and outcome is crucial to a positive embrace of the concept of adaptive management in NRM MER. Employing research and interpretative techniques in this manner is possibly the most underestimated element of NRM MER.
Proposed actions for advancing regional NRM MER

A CMA workshop developed the following concepts to help them advance their NRM MER capabilities.

CMAs helping themselves

- A new forum for NRM MER has been proposed. This could have two main foci, (i) for fundamental information sharing between regions and (ii) to provide a collective regional Victorian voice in NRM MER. This forum would be run by the CMAs with involvement from State and Australian Governments. This could be partially facilitated through the use of a web based discussion board.

Some short term tangible outputs

- A meaningful shorter term objective could be to develop statewide catalogues of natural resource monitoring, data and knowledge products for regions in Victoria. This would assist CMAs/regions in efficiently accessing information outside their boundaries. It would also generate some momentum in advancing NRM MER.

Engagement with State and Commonwealth

- Regional workshops could be organised from State and Australian Government representatives to communicate State and Commonwealth NRM MER objectives and how these relate to the CMAs, regional partners and local communities.
- The State could undertake to produce an Integrated NRM strategy that encompasses the National Monitoring and Evaluation Framework.
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- Felicia Choo (GHCMA)
- Dugal Wallace (Victorian NAP Office)

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**Abbreviations**

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<th>Abbreviation</th>
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<td>CAMS</td>
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<td>CCMA</td>
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<td>CMA</td>
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<td>DPI</td>
<td>Department of Primary Industries</td>
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<td>EC</td>
<td>Electrical Conductivity</td>
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<td>EGCMA</td>
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<td>EPA</td>
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<td>EVC</td>
<td>Ecological Vegetation Class</td>
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<td>GINRF</td>
<td>Gippsland Integrated Natural Resources Forum</td>
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<td>IP</td>
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<td>Integrated Catchment Management</td>
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<td>Monitoring and evaluation working group</td>
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<td>MFT</td>
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<td>National Action Plan for Salinity and Water Quality</td>
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<td>Pest plants and animals</td>
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<td>RCIP</td>
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<td>RCS</td>
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<td>Acronym</td>
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<td>RCT</td>
<td>Resource condition target</td>
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<td>RDN</td>
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<td>RMP</td>
<td>Regional management plan</td>
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<td>SGMN</td>
<td>Salinity groundwater monitoring network</td>
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<td>SOBN</td>
<td>State observation bore network</td>
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<td>VCIO</td>
<td>Victorian catchment indicators online</td>
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<td>VCMC</td>
<td>Victorian Catchment Management Council</td>
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<td>VRO</td>
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<td>Victorian water resources data warehouse</td>
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<td>WCMA</td>
<td>Wimmera Catchment Management Authority</td>
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1. **Introduction**

1.1 **Purpose**

The challenge to develop measures of environmental condition to help identify the effectiveness of natural resource management (NRM) has been recognized amongst stakeholders for some time. There are potentially many stakeholders in NRM, offering the potential to share existing facilities and experiences, and the coordination of effort to maximize the return on investment. This applies to monitoring, evaluation and reporting (MER) capability as much as the management actions themselves.

To realize this potential and to be able to identify the future opportunities, a consolidated picture of what the key stakeholders currently have in place for MER and how effectively their needs are being met is required. This review offers the opportunity to assess the capabilities, deficiencies and matching of MER effort across Victoria and its regional catchment management authorities (CMAs).

This review directly assists the National Land and Water Resources Audit (NLWRA) in assessing effectiveness of its Matters for Targets and indicator framework, in addition to providing Victorian stakeholders the contemporary issues and opportunities associated with NRM MER.

MER is a broad concept that is not encompassed in its entirety here. The emphasis is on catchment condition monitoring and reporting as this is consistent with the focus of the NLWRA objectives. This is not to ignore the importance of evaluation (for instance testing of technical assumptions and learning from the results) but this probably deserves consideration on its own.

The purpose of this study is to describe:

- the status of NRM MER capability currently in place in the Victorian CMA regions
- the alignment of this activity with the National Monitoring and Evaluation Framework
- how stakeholders assess their current NRM MER in meeting their needs
- activities underway or planned to enhance NRM MER capability
- additional needs in NRM MER

1.2 **The status of natural resource management**

The coordination of natural resource management (NRM) across Australia is maturing, with attempts to align it across the various levels of government and regional catchment management authorities. This has largely emerged with the implementation of the NAP and NHT programs. The levels of sophistication in how we view NRM have also risen markedly, such as linking and taking account of the trade-offs between the environmental, social and economic outcomes. These developments have no doubt added pressure to the role of natural resource managers, with related accountabilities now a requirement in regional catchment strategies and investment plans.

The contemporary approach to NRM embodies a partnership approach to decision making and action based on weighing the best possible information at the time. This contrasts to the ‘silo’ approaches of the past in regards to research, investor and outcome. Participatory decision making effectively occurs at the regional level, in Victoria is vested in its catchment management authorities. SKM (2004) refer to five critical elements in the NRM decision making process within a region:

- a functioning network of collaborating partners within a region
- an effective monitoring framework to collect relevant and valuable information
• an effective evaluation system in order judge program performance
• an effective process of reporting to stakeholders
• effective feedback loops to enable programs to learn

The question is how well are these elements being executed, and is it leading to measurable benefit? NRM is complex. It has stakeholders at all levels, from the primary funding bodies to local communities at the catchment level. Significant resources are being committed to ensure that NRM programs are linked and that accountability protocols are in place, but is this program sophistication matched by the actual development of knowledge and its delivery to the community? A feedback loop is ultimately essential for NRM to move forward in an efficient manner, this means the opportunity for stakeholder scrutiny of outputs/outcomes. Enhanced knowledge management capability is especially crucial in NRM where there are currently many service providers.

A monitoring, evaluation and reporting (MER) framework embodies much of the above, and these are currently being wrestled with across the regions. There is a broad spectrum of stages of development in MER plans, with some regions at the forefront of exploring MER whilst others are waiting for their RCIP to proceed.

1.3 NRM Monitoring, Evaluation and Reporting (MER)
Monitoring is the systematic collection of data. Baseline monitoring provides the baseline social, economic or environmental data necessary for evaluating and reporting on catchment health. Targeted monitoring allows for the measurement of trends or changes that may be direct or indirect results of activities (PPCMA 2004).

Evaluation is conducted to assess the efficiency, effectiveness and appropriateness of actions. Evaluation may be based on qualitative or quantitative data (PPCMA 2004).

Reporting involves the documentation of results of monitoring and evaluation. Key purposes of reporting may include accounting for expended funds or feeding data into decision making processes (PPCMA 2004).

Apart from providing some overview comment on NRM MER activity across the CMA regions, this project applies a restricted definition to NRM MER. Monitoring relates to measurement of catchment condition rather than, say, the measurement of management actions. Evaluation essentially relates to the testing of assumptions between management actions and catchment health rather than project efficiency. Thirdly, reporting is in relation to catchment condition rather than items such as expenditure. Given this restriction in definition to catchment condition MER, the emphasis here is on monitoring and reporting activities as this has synergies with the NLWRA objectives for this work. Evaluation is briefly discussed but deserves detailed consideration on its own beyond what is possible here.

Through this report there will also be a distinction drawn between in-project/program MER and ‘umbrella’ MER. The latter relates to the aggregation of a diverse range of project or program activity to derive an overall picture, whether this be for the purpose of Region, State or Commonwealth.

1.3.1 The challenges for NRM MER
SKM (2004) produced an overview of MER frameworks for Gippsland NRM managers that focuses on the general concept of MER in NRM and examples of its usage. This overview presents some significant insights, but chiefly concluding that historically:

• NRM approaches have been constrained by the lack of consideration of social and economic impacts; a scientific reductionist approach; and single investor funding
That feedback from MER programs has tended not to be delivered to the stakeholders that really matter, so that the NRM program does not gain ownership, positive reinforcement or the benefits of adaptive management. SKM (2004) advances that a contemporary approach to monitoring, evaluation and reporting is driven by stakeholder information needs and their ability to contribute feedback in order to allow continual improvement. The point is made that this contemporary approach is demonstrated in the corporate sector where the drive for efficiency forces the feedback loop to operate between investors, consumers, shareholders and companies.

This is not that NRM should be simply compared to the global economic system, as NRM involves a marriage of complex interdependencies that are not easily interpreted and reported. The challenges in embracing NRM MER is reflected in a scan of the international literature by SKM (2004) that revealed ‘few, if any examples that can demonstrate a closed loop approach to monitoring, evaluation, reporting and feedback that can demonstrate its contribution to continuous improvement in natural resource management’. More singly dimensioned programs such as Waterwatch and the Omeo Restoring the Balance Program have been regarded as successful ones, their relative simplicity obviously aiding this.

Nonetheless the complexity in NRM does not directly explain the traditional tendency to report upwards to funding bodies such as state and federal governments who see themselves as the NRM investors. Reporting is probably seen as a means to justify expenditure and to secure the next funding block rather than the mechanism to facilitate a genuine feedback loop.

SKM (2004) purports that in a regional context that institutional funding arrangements governed by purchaser-provider business models between state agencies inhibits regions to be able to more flexibly utilize their funds within their own understood NRM context.

1.4 NRM Indicators

The CSIRO on-line Guidebook for Environmental Indicators (www.csiro.au/csiro/envind/code/pages/menu.htm) presents an informative general framework and guidelines for using environmental management indicators. It does not deal with the discussion of specific indicators, but provides a starting point in considering environmental indicator selection irrespective of scale. The role of indicators in the environmental management cycle is discussed. The website provides a useful set of definitions and references surrounding indicators.

The CSIRO guidebook defines an environmental indicator as comprising some useful physical, chemical, biological, social or economic variable which can be measured in a defined way for environmental management purposes. Sometimes this is used to define an attribute, with the indicator being an aggregation of issue related attributes. Indicators are used to deliver the information to help make decisions. They often appear simple, but in fact represent key aspects of complex environments. Indicators should help describe the nature and size of environmental problems, provide a framework for setting goals for their solution, and be a mechanism for tracking progress towards goals.

The CSIRO guidebook argues that a good environmental indicator has the characteristics:

- an agreed, scientifically sound meaning
- represents an environmental aspect of importance to society
- tells us something important, and its meaning is readily understood
- has a sound and practical measurement process
- helps focus information to answer important questions
- assists decision making by being effective and cost-efficient to use.
1.5 NRM MER accountabilities

1.5.1 Stakeholders

In Victoria a number of stakeholders actively require information of MER activity that can be generally classified as follows:

- Regional catchment management authorities (CMAs) need to be able to regularly monitor, evaluate and report on the state of key regional assets and the progress being made towards the achievement of environmental targets so as to determine the effectiveness of their Regional Catchment Strategies (RCSs). This is a particular challenge in the absence of a functioning state NRM strategy. The CMAs are working on the definition of appropriate measures and the ongoing collection of data and delivery of information required to monitor them.

- The Victorian Catchment Management Council (with the assistance of state agencies) that has the statutory responsibility for statewide catchment condition reporting. Victoria has produced and published two comprehensive reports on catchment condition (1997 and 2002). While significant advances were made between these two reports in clarifying and addressing monitoring and evaluation needs, there were still significant gaps that need to be addressed prior to the delivery of the next report.

- State and Commonwealth investors of public funds are now placing greater emphasis on the setting of targets and measurement of performance against those targets when assessing and making investment decisions. The availability of consistent, quality monitoring information and the expert evaluation of it will be essential to achieving this.

- The National Land and Water Resource Audit (NLWRA) has as one of its short term objectives the assessment of the National Monitoring and Evaluation Framework indicators and methods for application at the regional scale. This includes determining the availability of existing data to report against these indicators.

- The Commissioner for Environmental Sustainability, appointed by the Victorian Government to be responsible for the preparation of the State of the Environment Report of Victoria, and for annual reporting on the implementation of environmental management systems.

- There is increasing interest from the private sector in monitoring, evaluation and reporting, through activities such as corporate environmental reporting and industry specific Environmental Management Systems.

A range of organizations from federal to regional levels have an interest in natural resource indicators. Seeking consistency on indicators to improve efficiency and effectiveness of catchment health measurement and reporting is a common objective, though this is complicated by the regulatory requirements of each jurisdiction. These relationships are identified in Figure 1.
Figure 1: NRM MER responsibilities relevant to Victoria
1.5.2 National organizations and legislative requirements

National Land and Water Resources Audit (NLWRA)
(refer to http://www.nlwra.gov.au/)

The NLWRA (the Audit) was established under the Natural Heritage Trust of Australia Act 1997. From 1997 - 2002 the Audit significantly progressed the collection and collation of primary data and information related to Australia's natural resource management. The Natural Heritage Ministerial Board (NHMB) has approved a continuation of the Audit from through to 2007. The objectives of this second phase are to facilitate improved decision-making on natural resource management by:

- assisting in the identification of natural resource management priorities
- allowing the progress of NRM investments to be assessed through the development and maintenance of accurate, cost-effective, contemporary, accessible and timely data and information on the nation's natural resources

The National Land and Water Resources Audit reports to the Natural Heritage Ministerial Board. It works with government agencies, regional natural resource management groups and community stakeholders through the Audit Advisory Council and the Land Water and Bio-diversity Advisory Committee of the NRM Ministerial Council.

Department of the Environment and Heritage

The Australian Government has responsibility for enacting the Environment Protection and Biodiversity Conservation Act 1999.


This protects matters of national environmental significance in relation to Commonwealth land and covers actions taken by the Commonwealth. Matters of environmental significance protected by the Act include:

- World Heritage properties
- National Heritage places
- Ramsar wetlands of international importance
- Nationally threatened species and communities
- Migratory species
- Nuclear actions
- Commonwealth marine environment.

National Action Plan (NAP) and Natural Heritage Trust (NHT)
(refer to http://www.nrm.gov.au/)

The Joint Commonwealth/State Steering Committee (Joint Steering Committee) provides overall management of the NAP and NHT2 programs within Victoria, its roles including:

- reviewing performance against milestones and authorising quarterly payments
- reporting decisions and decision making processes on investments
- submitting progress reports and annual reviews of programs to ministers.

Frameworks for ensuring program consistency and accountability are outlined below. A range of national strategies, guidelines and plans related to NRM are listed in http://www.nrm.gov.au/

Both the NAP and NHT Bilateral State-Commonwealth agreements stipulate that RCSs can form the accreditation required to access NAP and NHT funds. The NAP and NHT bilateral agreements also
stipulate the development of three year rolling regional catchment investment plans (RCIPs) aimed at achieving the NAP and NHT outcomes as identified in an accredited RCS. The management arrangements under which an RCIP is delivered is described within a regional management plan (RMP) that is coordinated by a CMA.

CMAs in the priority regions/catchments for the NAP include are the Corangamite, Glenelg-Hopkins, Goulburn-Broken CMA, Mallee CM, North-Central CMA and Wimmera CMAs. The remaining CMA regions (Port Phillip, West Gippsland, East Gippsland and North East) access only NHT2 funds.

**Murray Darling Basin Commission**  

The Murray Darling Basin Commission (MDBC) is the executive arm of the Murray-Darling Basin Ministerial Council (MDBMC) and is responsible for:

- managing the River Murray and the Menindee Lakes system of the lower Darling River, and
- advising the MDBMC on matters related to the use of the water, land and other environmental resources of the Murray-Darling Basin.

The MDBC is an autonomous organization responsible to the governments represented on the MDBMC. It therefore has a role in undertaking works and measures at the direction of the council, and also in coordinating the efforts of the government partners to the *Murray-Darling Basin Agreement*. It has the mandate to initiate, support and evaluate integrated natural resources management across the Murray-Darling Basin. The MDBC comprises an independent President, two commissioners from each partner Government (the Commonwealth, NSW, Victoria, SA and Qld) and a representative of the ACT Government.

The Commission works cooperatively with the partner governments, committees and community groups to develop and implement policies and programs aimed at the integrated management of the Murray-Darling catchment and managing and distributing the water of the River Murray in accordance with the *Murray-Darling Basin Agreement*.

### 1.5.3 State organizations and legislative requirements

Through DSE, EPA, VCMC and the newly established Commissioner for Environmental Sustainability, Victoria has a range of capabilities and legislative instruments to manage natural resources across the state and its regions.

**Department of Sustainability and Environment (DSE)**  

DSE leads Victoria’s whole of government approach to integrating sustainability into its decision making processes. As a recently restructured entity DSE incorporates the state’s responsibilities for managing both Victoria’s natural and built environments. DSE reports directly to the ministers for Environment, Water and Planning.

The DSE corporate plan (DSE 2003a) identifies a key mission of the department is to deliver the government’s vision of positioning Victoria as a world leader in sustainability. This it will achieve in conjunction with a range of partners from state to local authorities and other government departments. DSE has a lead role in facilitating engagement between these partners and the general community. Victoria’s commitment to environmental sustainability is described in key policy documents such as *Growing Victoria Together* and *Melbourne 2030* and a series of policy statements on land, water and energy.

DSE has responsibility for officiating a number of legislative acts such as the *Flora and Fauna Guarantee Act (1988)*, *Water Act (1989)* and the *Heritage Rivers Act (1992)*.
Flora and Fauna Guarantee Act 1988

The Flora and Fauna Guarantee Act is the main piece of Victorian state legislation for the conservation and protection of threatened species and ecological communities and for the management of potentially threatening processes.

Water Act 1989

This Act offers strong legislation for allocating surface and ground water throughout Victoria. It impacts upon rivers, streams and groundwater. The Water Act details both Crown and private entitlements to water from surface and groundwater sources. It allows authorities and individuals to use water either through bulk entitlements, licenses or sales water. The Act covers both irrigation and stock and domestic entitlements. The Water (Irrigation Farm Dams) Act 2002 amended the Water Act 1989 to also cover irrigation and commercial dams on or off waterways, and clarifies the environment's access to water.

Heritage Rivers Act 1992

The Heritage Rivers Act identifies 18 Heritage River Areas in Victoria. The Act protects public lands in specific parts of Heritage Rivers or river catchment areas which have significant recreation, nature conservation, scenic or cultural heritage attributes. It prohibits some land and water-related activities in heritage river areas, and, under some circumstances restricts diversions, clearing, plantation establishment and grazing.

Environmental Protection Authority, Victoria (EPA)

(refer to http://www.epa.vic.gov.au/)

The Victorian EPA is a statutory body that oversees the implementation of the Environment Protection Act 1970. The EPA is legally constituted by an appointed chairman whom is assisted by a board, executive and staff. The chairman reports to the Minister for the Environment. The EPA maintains standards of environmental quality through the mechanisms of work approvals, licenses, inspections, pollution abatement notices and land use planning referrals.

In its administration of the Act the EPA operates under the principles of precaution and polluter pays. It has a principal role for the protection of biodiversity and intergenerational equity.


This legislation enables the EPA to improve air, land and water environments by managing waters, controlling noise and controlling pollution. It is focused on protecting the environment through reducing human impact on our air, land and water.

Subservient to the Environment Protection Act are State Environment Protection Policies (SEPPs). SEPPs provide goals and structures to protect the environment for the community both now and into the future. SEPP represents a range of state legislated environmental protection policies (SEPPs) that provide more detailed requirements and guidance for the application of the Environment Protection Act (1970) of Victoria. SEPPs aim to safeguard:

- human health and well-being;
- ecosystems;
- visual, aesthetic and local amenity

SEPPs express in law the community’s expectations, needs and priorities for using and protecting the environment. They define environmental quality objectives and describe the programs that will ensure environmental maintenance. Under the Act the requirements in environmental regulations, including works approvals and licences, must be consistent with SEPPs.
Victorian Catchment Management Council (VCMC)

The Victorian Catchment Management Council (VCMC) is the State Government's peak advisory body on catchment management. It was appointed under the CALP Act to advise the Minister for Environment (and others as required) on land and water management across Victoria. The VCMC is an agency and government independent organization that aims to take a long-term view in developing its vision for catchment management, "Victoria will have healthy rivers flowing through ecologically sustainable and productive catchments".

The VCMC works alongside DSE, DPI and the Victorian EPA. By facilitating a range of communication exchanges it also encourages cooperation between the major sectors of local government, community conservation and environment organizations, industry, state and federal agencies and regional CMAs. The VCMC has a relationship with CMAs by virtue of a VCMC representative sitting on the CMA Chairs and CEOs forum for sharing information.

The organizational relationship between the VCMC and CMAs is ideally captured in the Catchment Management Framework. The Catchment Management Framework encompasses the ten Catchment Management Authorities (CMAs) covering the ten catchment regions across the state. This concept was derived from regional community land management activity that predominates over the 64% of Victoria's privately owned landscape, so ensuring the need for community participation to address NRM and sustainability issues.

The major statutory responsibilities of the VCMC are to:

- Report annually on the operation of the CaLP Act 1994
- Report every five years on the environmental condition and management of Victoria's land and water resources through the VCMC Catchment Condition Report (completed for 1997 and 2002)
- Developing mutually beneficial partnerships

The mission of the Catchment Management Framework has been developed to achieve:

- Community involvement in and commitment to natural resource management
- Ecologically sustainable development of natural resource-based industries
- Maintenance and improvement in the quality of water and condition of rivers
- Prevention and reversal of land degradation
- Conservation and protection of the diversity and extent of natural ecosystems
- Minimization of the economic and environmental impacts of pest, plants and animals.

To achieve these outcomes, Victoria has six principles that govern the way catchment management is implemented throughout the State:

- Ecologically Sustainable Development
- Community Empowerment
- Integrated Management
- Targeted Investment
- Accountability
- Administrative Efficiency

Commissioner for Environmental Sustainability

Victoria's Commissioner for Environmental Sustainability was appointed by the Victorian Government in October 2003. The mission of the Commissioner is to balance economic, societal and environmental factors in order to build a more prosperous state. The Commissioner will help achieve this through:
NRM monitoring, evaluation and monitoring in Victoria – regional perspectives

- preparing State of the Environment reports;
- undertaking annual audits of government departments’ implementation of environmental management systems; and
- auditing public education programs on ecologically sustainable development.

The Office of the Commissioner is independent and reports directly to the Minister for the Environment.

1.5.4 Regional organizations and legislative requirements

Catchment Management Authorities

The Victorian Government claims a committed role in integrated catchment management as an important way of achieving sustainability. In Victoria, the concept of integrated catchment management (ICM) underpins sustainable management of land and water resources and contributes to biodiversity management. This is administered through the Catchment and Land Protection Act 1994 that divides Victoria into ten catchment regions with a Catchment Management Authority (CMA) within each. The principle elements of CMA structure include a board (to develop strategic direction), implementation committees (for overseeing detailed work programs by applying community scrutiny) and staff (to assist in developing and enacting works programs). The basic structure of a CMA is designed to maximize community involvement in setting priorities and decision-making.

Under the Act the CMAs are responsible for the development and review of Regional Catchment Strategies (RCS) every 5 years. For each catchment an RCS must:

- assess the land and water resources and their use in the catchment
- assess the nature, causes, extent and severity of land degradation of the catchment in the region and identify areas for priority attention
- identify objectives for the quality of the land and water resources
- establish a program of measures to promote improved use of land and water resources and to remediate land degradation
- specify procedures for monitoring the implementation of the strategy, achieving the land and water resource quality objectives and assessing the effectiveness of the program.

These documents are heavily based on community input and set the strategic directions and priorities for natural resource management at the local level. The RCS documents are underpinned by Action or Implementation Plans with clear description of on-ground programs and activities. These supporting plans provide the detail for the efficient and cost effective investment in resource management at the local level. They are expected to make clear provisions for ongoing investment in environmental monitoring, evaluation and reporting with clear targets and performance measures.

Reporting requirements of CMAs are outlined under the Catchment and Land Protection Act. The authorities must “…submit to the Minister and the Council on or before 31 August in each year a report on the condition and management of land and water resources in its region and the carrying out of its functions.” Despite this the framework for delivering this obligation remains unclear. Currently CMA annual reports tend to highlight statutory responsibilities and financial statements rather than summaries of catchment condition.
2. **MER strategies, standards and frameworks in use**

2.1 **National MER**

2.1.1 **National Natural Resource Management Monitoring and Evaluation Framework**
This national framework (NRMMC 2003a) is aimed at assessing progress related to the:

- health of the nation's land, water, vegetation and biological resources; and
- performance of programs, strategies and policies that provide national approaches to the conservation, sustainable use and management of these resources.

The intention is for this framework to apply broadly to NRM programs including those nationally funded such as NHT and NAP. The monitoring and evaluation framework aims to ensure that processes are useable, cost-effective, accurate, comprehensive and transparent. The framework provides the logic, guidelines and a set of expectations within which the state (and hence regional) parties need to develop their own MER strategies. This is outlined in the NHT and NAP Bilateral Agreements between the states/territories and the Commonwealth. Effective monitoring and evaluation arrangements will need to be in place at the regional level in order for the accreditation of regional catchment strategies in Victoria and the continuation of funding through the RCIPs.

2.1.2 **National Framework for Natural Resource Management Standards and Targets**
The standards and targets framework (NRRMC 2003b) sets out national outcomes that investment in natural resource management (through programs such as the NAP and the NHT) should work to achieve. The framework also identifies 'matters for targets', designed to help focus efforts to achieve the national outcomes. There are Indicators developed to provide the measures for each of the 'matters for target'. Regional NRM plans will need to set targets, where possible, for all relevant 'matters for targets' listed in the framework.

Targets can be characterized as follows:

- **Aspirational targets**
  Long-term "targets" comprising aspirational statements about the desired condition of their natural resources in the longer term (e.g. 50+ years). These are aimed at providing context for measurable and achievable targets described below.

- **Resource condition targets (RCTs)**
  Specific, practical, time bound and measurable targets, relating to resource condition, against the minimum set of matters for regional targets. Timeframe for achievement are expected to be around 10-20 years. Both aspirational and resource condition targets are aimed to describe the resource condition objectives for the National Matters for Targets and other NRM related indicators.

- **Management action targets**
  Short term targets (1-5 years), relating mainly to management actions or capacity-building. These targets contribute to progress towards the longer-term resource condition targets.

2.1.4 **MDBC requirements**

**Integrated catchment management (ICM) strategy**
As outlined in their integrated catchment management strategy (MDBC 2001a), the MDBC is applying an assets and triple bottom line approach to setting targets. Their reference to assets and target setting is a broad one, not just related to protection of water, but including elements such as riverine ecosystems and terrestrial biodiversity. There is a progressive timetable for target setting. By 2008 it is expected that a framework for 'catchment health core signals' will be in place that encompasses the catchment targets.
The strategy indicates that development of the targets will be in full partnership with the catchment regions, but understanding that there must be consistency in approach across the Basin. It also mentions the establishment of a MER strategy that will be coordinated and integrated with processes already in place at national, state and regional levels. An important focus of the strategy is to monitor the effect by the implementation of biophysical targets on economic and social well-being. The Basin ICM Strategy is to be intended to be reviewed every three years (MDBC 2001a).

**Salinity indicators**

The Murray Darling Basin Ministerial Council Salinity Strategy (MDBC 2001b) sets salinity targets for each tributary valley and a Basin target at Morgan in South Australia. The Basin target, which is for the shared rivers, is to maintain the salinity at Morgan at less than 800 EC for 95 per cent of the time (MDBC 2001b).

Each state has agreed to produce Report Cards for annual reporting to the MDBC on each of their tributary valleys. The report cards are to include:

- assessed baseline conditions (as at 1 January 2000) for end-of-valley salinity, salt load and flow regimes;
- expected 'legacy of history' impacts on end-of-valley salinity, salt load and flow for 2015, 2050 and 2100;
- agreed end-of-valley salinity and salt load targets; and
- predicted effects of proposed significant in valley actions on end-of-valley salinity, salt load and flow conditions at 2015, 2050 and 2100 (MDBC 2001b).

On an annual basis each state will prepare a consolidated report card for the MDBC. A register of salinity credits and debits for achieving the Morgan target will be managed through the Commission A and B registers (MDBC 2001b). A program of rolling five year review and audit will occur for each valley and Commission Register entry.

### 2.2 Statewide MER

#### 2.2.1 Victorian NAP/NHT monitoring and evaluation implementation plan

In response to national NAP/NHT requirements and in keeping with that above-mentioned national frameworks the Victoria NAP/NHT Office has recently completed an implementation plan (NAP/NHT Victoria 2004a) guiding the establishment of processes to monitor and evaluate the progress and achievements of both programs. This aims to satisfy MER requirements of both the NAP and NHT2 Bilateral Agreements. The Victorian monitoring and evaluation implementation plan clarifies the roles and responsibilities of Commonwealth, State, and CMA stakeholders for monitoring, evaluation and reporting in the areas of:

- resource condition, performance information, indicators;
- data protocols and data collection processes;
- collection, storage, analysis and reporting of monitoring data;
- formats and agreed timelines for reporting achievement;
- evaluation and its implementation
- allocation of resources
2.2.2 Victorian catchment indicators
In its most recent report card (VCMC 2002) the VCMC reported on 32 catchment indicators. The development of this comprehensive indicator set was an outcome from review of the initial catchment health report, *Know your Catchments* (VCMC 1997). VCMC (2002) indicates that 260 people were involved in the consultation process to generate a list of 30 indicators. Of these, 27 were used in the 2002 report card, with a further five added relating to communities, estuaries, greenhouse emissions and climate change.

The indicators were developed to:
- identify the condition of land and water resources in a way to allow time comparisons
- to assess trends in management on the resource base
- to provide a basis for evaluating natural resource management programs
- to provide feedback to planning cycles and support policy development

The selected indicators are designed to be sensitive to change over short time periods of 3-5 years, as well as link to agency programs in order to be able to evaluate cause and effect. Nevertheless it is recognised that the value in monitoring may only be seen over 20 or 30 year period. Significantly, the indicators were not developed with aggregation in mind (VCMC 2002).

2.2.3 Monitoring partnerships
DSE is currently coordinating the development of partnerships with stakeholders across Victoria with a view to increasing efficiency, transparency and simplification in water resource monitoring arrangements (DSE 2003d). Current monitoring arrangements tend to be complex, characterised by non-transparent historical cost sharing arrangements, and embedded within a multitude of individual contractual arrangements between sub-components of the water resource monitoring program and a relatively limited field of contractors. It was anticipated that in early 2005 a series of surface water monitoring contracts would be let in the partnership regions, then work on adding groundwater monitoring to the partnerships would proceed. The *Gippsland Regional Water Monitoring Partnership* is the pilot for the State.
2.3 Regional MER

2.3.1 Corangamite CMA

The Corangamite CMA is yet to develop a MER strategy though this is planned in the 2004-05 RCIP. The process for this, which is under development, will be driven by a steering committee comprising members with expertise in and local knowledge of biophysical and socio-economic aspects. This will cover all relevant National MFTs.

The Corangamite RCS (CCMA 2003) identifies Report 13, Monitoring and Evaluation for Natural Resources Management in the Corangamite Region which details a framework and process for building the overall monitoring and evaluation framework for the Region. This framework was developed to measure progress towards meeting targets in the implementation of the RCS (CCMA 2003). Linkages between MFTs and RCTs defined in the RCS have been established, but some difficulties have been encountered in extending this to greater levels of detail.

A preliminary set of indicators were selected which were expected to be refined during 2003-2004 (CCMA 2003). These would need to be aligned to the National Matters for Targets Framework, as the documentation on the latter was not available at the time of the RCS preparation. Key agencies responsible for NRM monitoring were also identified, but this information requires updating due to subsequent restructures of those organizations.

Richard Barratt1 (pers. comm.) indicated that the refinement and alignment of M&E systems is occurring through renewal of asset/threat based sub-strategies and action plans which post-dates the release of the RCS and National M&E and targets frameworks (e.g. implementation of improved index of stream condition monitoring in the region). The need for an integrated approach to address gaps and optimize delivery of information for effective NRM management and reporting at regional, state and national level is recognized and is a key driver for regional M&E Strategy development. An unfortunate outcome of this is some inconsistency in detail (but not intent or ultimate outcome) with indicators and RCTs in the RCS, which complicates assessment of “contribution to target”.

M&E considerations at sub-strategy level have raised a number of issues regarding current baseline and benchmarking information, particularly in relation to soils, biodiversity and coastal and marine indicators. Dahlhaus et al (2004) recently completed a draft review into groundwater monitoring across the CCMA. As well as discussing the application of a recently developed regional integrated groundwater database for the region, the review encompassed an assessment of the salinity groundwater monitoring network (SGMN) coordinated by DPI. The review strongly questioned the integrity of the SGMN, particularly in relation to the generally poor or unprotected condition of the monitoring bores and the lack of recorded data on bore construction.

2.3.2 East Gippsland CMA

The Gippsland region is currently pursuing the MERGe program (Monitoring, Evaluation and Reporting, Gippsland) that aims to develop a flexible framework for MER activities that will inform the management of NRM across the region into the future. This MERGe project is jointly funded by West Gippsland CMA, East Gippsland CMA (through NHT), and the Gippsland Lakes Taskforce. The MERGe project is supported by the Gippsland Integrated Natural Resources Forum (GINRF) that comprises a diverse set of stakeholders from across the region. It has the representation to balance the need for environmental, social and economic outcomes from NRM. GINRF recognizes the need for NRM programs to be driven by the explicit needs of stakeholders rather than scientific desire (SKM 2004). A current priority is the coordination of information collation through the Regional Information System.

Three main outputs will result from the MERGe Framework: the East and West Gippsland RCS MER plans, and a report on the health of the Gippsland Lakes.

An introduction to MER concepts was provided to the region by SKM (2004). This was produced as a discussion document as an initial phase in the development of the regional MER strategy. The 2nd stage

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1 Richard Barratt (CCMA M&E coordinator) November 2004
draft of the MERGe process has now been completed, that in part comprises a case study into the state of the Gippsland Lakes. It strongly recommended to the Gippsland Lakes Taskforce the need to review and enhance monitoring programs. It determined that there is a significant lack of systematic data management. A final MER framework for the Gippsland region is expected in October 2004. At the current stage of the MER development process there is an emphasis on information management.

The East Gippsland MER strategy will draw on the broader MERGe outcomes. The EGCMA value the importance of coordinated and collaborative information gathering by the various organizations in East Gippsland to improve the collective understanding of NRM issues (EGCMA 2004).

2.3.3 Glenelg Hopkins CMA
The GHCMAs is planning on developing a MER strategy.

The current RCS (GHCMAs 2003) highlights an objective to improve the accessibility of monitoring and evaluation results through the Glenelg Hopkins website. This is consistent with the CMA’s advanced development of an on-line, searchable research compendium (Eddie Meulman2 pers. comm.). The GHCMAs has also prepared a research strategy for integrated catchment management. Whilst the focus of this work is on identifying research priorities there are opportunities for alignment with MER.

The RCS describes an objective to improve community capacity in MER and to capture information collected by community groups such as Field Naturalists (GHCMAs 2003).

The GHCMAs is a partner with Deakin University in the South West Regional Sustainability Project. This is an ongoing research project that aims to develop a holistic sustainability index that is to be reported for the 32 GHCMAs sub-catchments (Anne Wallis3 pers. comm.). ‘Report cards’ are to be developed to engage in sustainability with catchment communities. A community consultation process has resulted in the identification of 44 high priority indicators, that, interestingly are weighted towards environment rather than social or economic indicators. At this stage data limitations are restricting usage to 17 indicators. This project is revealing numerous concerns about data adequacy. The project currently supports two PhD projects.

Heislers et. al. (2004) recently undertook a review of groundwater and salinity discharge monitoring, evaluation and reporting occurring across the GHCMAs region.

2.3.4 Goulburn-Broken CMA
The Goulburn Broken catchment MER strategy (Garrett and McLennan 2004) encompasses all activities impacting on natural resource management (NRM) within the region, not just traditional activities supported by the GBCMA or NAP/NHT.

In particular the strategy emphasises:

- the complex, hierarchical and integrated nature of MER activities given the breadth of NRM and the diversity of its stakeholders (so that the strategy cannot solve every issue but hopefully lead to efficiencies in MER delivery)
- that there needs to be flexibility in assessing and valuing MER activity given that many of its objectives are long term, and that programs and policies will alter over time affecting outcomes
- the necessity to effectively report outcomes to all stakeholders so that they can advance their NRM knowledge to be properly engaged in decision making processes
- the need to maximize the consistency of language and frameworks in NRM plans in order to aid the integration of inter-related activity

Objectives, actions and targets relating to implementing a MER strategy are organized into five categories:

1. Participative decision-making

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2 Eddie Meulman (GHCMAs Land and Biodiversity Program Manager) October 2004
3 Anne Wallis (Sustainability Researcher, Deakin University) September 2004
2. Community and industry MER activities
3. Data knowledge and quality – environment, economic, social and institutional
4. Project and issue management
5. Database management and information exchange

The strategy emphasises that there is nested MER activity, in that small MER cycles occur within larger ones. This is important to understand as there are different timeframes and reportees for different types of information.

A costed implementation of the GBCMA MER strategy is provided.

2.3.5 Mallee CMA

The Mallee CMA has developed a Monitoring and Evaluation Framework that is separate to the RCS aimed at supporting its implementation. A primary aim for this framework is to develop a base data set on the assets of the Mallee region. This will cover both asset condition and the threats to these assets (MCMA 2003a). The RCS mentions that the resource condition targets encompass the Matters for Targets indicators, though the links are not discussed in detail.

In the last 12 months the MCMA have progressively developed a series of catchment condition reports based on the graphical VCMC report card approach. This is used to represent the condition of a range of assets or threat status across the MCMA region. These reports also offer discussion of the catchment health indicators used and the applicability of the MFT Indicator framework.

Water resources catchment condition report (MCMA 2003b)

This revolves around the key assets of the Murray River and the Murrayville Limestone aquifer. Both water quality and resource usage are considered. In measuring resource use there is significant reliance on irrigation diversions data. The impacts of irrigation on water quality, salt loads and nutrients are also captured. The report presents a number of recommendations that deal with data deficiencies and interpretation methods.

Land resources catchment condition report (MCMA 2004c)

This report aims to assess condition of agriculture, biodiversity and community infrastructure assets on the basis of (i) salinity impact, (ii) soil health and land capability impact and (iii) agricultural impact indicator themes. It was concluded that the relevant MFT Indicators were difficult to apply for a range of reasons:

- the last significant salinity mapping program was in 1971 (there is no reliable map of the current situation)
- there are limitations in the current capacity to monitor and effectively interpret groundwater depth and trend across the Mallee region
- many of the regional aquifers are already saline so there is little extra purpose in using the groundwater salinity indicator
- there is no effective management strategy to measure the extent and impact of pest plants and animals (PPA)

Interim report on the condition of waterways, wetlands and floodplains (MCMA 2004b)

This was devised as an interim report owing to a concurrent number of projects aiming to improve the data stocks for reporting on aquatic condition. An identified constraint was the inadequacy of the Index of Stream Condition (ISC) to deal with the lowland and ephemeral streams characteristic to the Mallee region. The report indicates the use of MFT indicators where practicable (those that are subsumed in the ISC), though suggests that many of these indicators are not suited to the natural variability inherent in the ephemeral waterways of the region. Murray River floodplains are a significant environmental asset of the

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Mallee region though there are no MFT Indicators suited to these environments. It is suggested that the saline wetlands common to the region are also difficult to characterise within the national indicator framework. There is mention of the difficulty in measuring progress towards a number of the RCTs.

*Draft biodiversity catchment condition report (MCMA 2004a)*

The biodiversity catchment condition report also purports the use MFT indicators where practicable. Deficiencies are noted in the systematic monitoring of threatened species and the characterization of key habitat areas. Some RCTs are found to be difficult to report progress towards either because of difficulty in measurement or the inadequate quantification of the RCT itself.

### 2.3.6 North Central CMA

A MER framework will be developed as a part of the North Central RCS implementation (NCCMA 2003). This framework will identify:

- to whom to report (e.g. NCCMA Board, Implementation Committees, funding bodies) for each measurable target
- the actual performance in the last 12 months
- the expected plan target performance
- the expected ‘no intervention’ performance
- National and State government monitoring requirements for RCS
- evaluation assumptions
- monitoring methods
- data custodian and storage protocols

To date this region has produced a conceptual structure of a database that catalogues existing NRM MER programs or projects. Activities in the catalogue are linked to the target or indicator frameworks at the national, state and regional level. The *MER Catalogue* is planned to be available on the region’s web interface and could include MapShare functionality to display activity locations.

### 2.3.7 North East CMA

The North East CMA is planning on developing a Monitoring, Evaluation and Reporting Plan consistent with the National Monitoring and Evaluation Framework. To date the NECMA has developed a draft working document describing the basis of a MER strategy (NECMA 2004b). This indicates that there will be tight linkages to the region’s RCS and the National and State monitoring and evaluation frameworks. It strongly emphasises the need for adaptive management, provided for by evaluation processes and invoking feedback loops. Documenting and testing assumptions that link outputs to outcomes are seen to be crucial.

The North East RCS (NECMA 2004a) does not directly refer to the National Matters for Targets and associated indicators, though it does encompass a number of the proposed National indicators.

The NECMA has enlisted the assistance of BRS to provide an overview role in the development of their MER strategy (Jeff Taylor pers. comm. October 2004)

### 2.3.8 Port Phillip and Westernport CMA

The Port Phillip and Western Port CMA approach to MER is contained within a chapter in their draft RCS (PPWCMA 2004). Many organizations are involved in MER in the PPCMA Region. One of the challenges outlined in the draft RCS is the need to reduce duplication and improve coordination in MER in the region. A target for the region is to have a regional catchment management reporting framework in place by 2006. This chapter of the RCS cites numerous actions and targets for establishing an effective MER program across the region.

The RCS objectives, targets, and actions have been matched with the Matters for Targets Framework.
2.3.9  West Gippsland CMA
The West Gippsland MER strategy will equally draw on the broader MERGe Framework (see 2.3.2). With respect to MERGe an initial undertaking of the WGCMA was to survey natural resource organizations across the East and West Gippsland regions for their aspirations in the forthcoming framework, in addition to capturing the nature of their monitoring programs across the region (Ethos NRM 2004).

In the West Gippsland RCS the National Matters for Targets are interspersed with each asset class and relevant resource condition targets (WGCMA 2004). This RCS does not devote a chapter to MER, rather it is integrated into the entire document.

2.3.10 Wimmera CMA
Monitoring and evaluation activities for the Wimmera RCS will focus on the condition of assets, mitigation of asset threats, and project implementation. This RCS discusses the future monitoring and evaluation requirements for the themes of land, biodiversity and water in the region (WCMA 2003).

More recently the region has undertaken a rapid appraisal of its RCTs in relation to the MFT framework, though, at this stage, this does not drop down to a discussion of the individual indicators (WCMA 2004). Many of the RCTs remain to be set for the region, awaiting outcomes from supporting projects during 2004-05. The WCMA have 36 RCT’s and 74 MAT’s as prescribed in the current RCS (Mark Edwards pers. comm.).

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4 Mark Edwards (Strategic Planning and Investment Manager, WCMA) November 2004
3. **Matters for Targets and Indicators**

3.1 Why matters for targets?
The National Standards and Targets Framework identify NRM outcomes and the minimum set of matters for which targets are to be set in the RCS.

3.2 Biophysical matters
Ten *Matters for Targets* (MFTs) have been identified within the National Framework for Natural Resource Management Standards and Targets. The set of MFTs have been signed-off by the NRM Ministerial Council (NRMMC) to represent the minimum set of themes to reasonably describe catchment health.

For each MFT *Indicator Headings* have been developed that describe different components of the MFT. These are then quantified or dimensioned by one or more *Recommended Indicators* (or just Indicators). The list of Indicator Headings and Indicators are underpinned by *Indicator Protocols* (where they are available) that provide a range of information including rationale and measurement methodology. Whilst all the Indicator Headings have been signed-off by MEWG a significant number of the Indicators and their Protocols remain to be agreed.

The indicators are being developed with their primary purpose being the measurement of the performance of investments made under programs such as the NAP and the NHT2. Another significant purpose is to develop consistency of approach and method in resource condition assessment that can be applied from national, state to regional jurisdictions. The intent is for catchment managers to adopt an indicator from the national framework if that manager is responsible for investments into the relevant MFT.

As a matter of principal indicators in the national framework are designed to be:

- simple (easily interpreted and monitored)
- measurable (statistically verifiable, reproducible and show trends)
- accessible (regularly monitored, cost effective and consistent)
- relevant (directly address the objectives of the NRMMC)
- timely (provide early warning of potential problems).

It has been proposed that the National Land and Water Resources Audit (NLWRA) assume the role of MEWG in advancing the development and agreement of the national MFT and indicator framework (Dugal Wallace\(^5\) pers. comm..)

From a state perspective there is alignment with the Commonwealth aspiration for a nationally consistent approach so long as they believe that the national indicator approach can be practically achieved within their respective jurisdictions (Dugal Wallace\(^6\) pers. comm.). In turn, within Victoria, CMAs are encouraged and will receive program support to adopt State agreed indicators. It is possible that there will be some national indicators that Victoria does not approve; it approves but with different specifications on national indicator protocol; or it institutes additional catchment health indicators.

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\(^5\) Dugal Wallace (Victorian NAP coordination) October 2004

\(^6\) Dugal Wallace (Victorian NAP coordination) November 2004
Table 1. Matters for Targets, Indicators and Status

<table>
<thead>
<tr>
<th>Matter for target</th>
<th>Indicator heading</th>
<th>Indicator</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land salinity</td>
<td>Area of land threatened by shallow or rising watertables</td>
<td>Depth GW</td>
<td>Agreed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GW salinity</td>
<td>Agreed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Area salt affected land</td>
<td>Agreed</td>
</tr>
<tr>
<td>Soil condition</td>
<td>Soil condition</td>
<td>Soil acidification</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil erosion – water</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil erosion – wind</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil carbon content</td>
<td>For advice</td>
</tr>
<tr>
<td>Native vegetation communities’ integrity</td>
<td>Extent</td>
<td>Extent of priority type by IBRA sub-reg.</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td>Condition</td>
<td>Extent of present type by IBRA sub-reg.</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of pre-Euro extent by type by IBRA sub-reg.</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% condition class by type by IBRA sub-region</td>
<td>For advice</td>
</tr>
<tr>
<td>Inland aquatic ecosystems integrity</td>
<td>River condition (for advice)</td>
<td>Benthic macro invertebrate community assemblages</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td>Wetland extent</td>
<td>Fish community Assemblages</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td>Wetland ecosystem condition</td>
<td>Benthic diatom community assemblages</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Riparian vegetation community assemblages</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Riverine physical structure and in-stream habitat</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water quality</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hydrology</td>
<td>For advice</td>
</tr>
<tr>
<td>Estuarine, coastal and marine habitat</td>
<td>Habitat extent</td>
<td>Extent</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td>Habitat condition</td>
<td>Condition</td>
<td>For advice</td>
</tr>
<tr>
<td>Nutrients in aquatic environments</td>
<td>Nitrogen</td>
<td>Total N and flow leaving (sub) catchment</td>
<td>Agreed</td>
</tr>
<tr>
<td></td>
<td>Phosphorous</td>
<td>Total Ph and flow leaving (sub) catchment</td>
<td>Agreed</td>
</tr>
<tr>
<td>Turbidity and suspended particulates in aquatic environments</td>
<td>Turbidity/suspended solids</td>
<td>Turbidity or TSS and flow</td>
<td>Agreed</td>
</tr>
<tr>
<td>Salinity in fresh aquatic systems</td>
<td>In-stream salinity</td>
<td>TDS and flow or EC and flow</td>
<td>Agreed</td>
</tr>
<tr>
<td>Significant native species and ecological communities</td>
<td>Extent, conservation status</td>
<td>Range area and location of species</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Key species habitat extent, condition</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Species relative abundance</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extent of ecological community</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Condition of ecological communities</td>
<td>For advice</td>
</tr>
<tr>
<td>Ecologically significant invasive species</td>
<td>Marine</td>
<td>Presence of exotic species</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td>Vertebrate (non marine)</td>
<td>Presence of native pests in ports/harbours</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td>Terrestrial weeds</td>
<td>Reduction in impacts</td>
<td>For advice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extent and density of weeds under control programs</td>
<td>For advice</td>
</tr>
</tbody>
</table>
3.3 Management action matters
Only three Management Action Matters for Target have been determined to date as it is perceived that management actions to reverse resource degradation are likely to significantly variable across the regions. Indicators of improved management practice may be specific to a region but more broadly relevant indicators, for example, might include extent of revegetation or of established perennial vegetation.

Table 2. Management Action Targets and Indicators

<table>
<thead>
<tr>
<th>Management Action Matter for Target</th>
<th>Recommended indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical assets identified and protected</td>
<td>• The extent to which assets are identified during the planning process</td>
</tr>
<tr>
<td></td>
<td>• Steps taken to protect assets identified in the plan</td>
</tr>
<tr>
<td>Water Allocation Plans developed and implemented</td>
<td>• Water allocation plans developed and implemented in accordance with relevant State or Territory legislation</td>
</tr>
<tr>
<td>Improved land and water management practices adopted</td>
<td>• Adoption of codes of practices or recommended practices that are identified in the regional plan</td>
</tr>
</tbody>
</table>

3.4 Socio-economic matters
Information for these indicators is already provided by the Australian Bureau of Statistics (ABS) and the Agricultural Bureau of Resource Economics (ABARE):

- Effectiveness of information networks
- Youth net migration
- Index of Economic Diversity
- Median income and income distribution
- Farm cash income
- Farm family off-farm income
- Farm Debt-equity ratio
- Education
- Age and experience
- Population Growth
4. **Collection and management of catchment indicator data**

Catchment health monitoring encompasses a wide range of disciplines, scales and objectives. Data and information is therefore collected and organized by a range of organizations that presents significant challenges to bodies that are obliged to report on catchment condition.

4.1 **Data collection**

In Victoria the bulk of catchment health data collection is in fact coordinated through state programs. Regional resource managers such as CMAs and water authorities collect additional information. Landcare groups and other landholder networks are a source of environmental health data at the local level. Some of this complexity is illustrated in Figure 1.

Of the relatively small amount of data collection that the CMAs manage or co-ordinate there are a range of business models operating, ranging from:

- in-house monitoring
- sub-contracting monitoring
- handling voluntary community data collection

Where specific expertise is required the sub-contracting model tends to be favored. In contrast data collected from traditional voluntary programs such as Waterwatch require CMAs building and maintaining relationships directly with community.

As there is a spectrum of data collectors, there is similarly a spectrum of data quality and confidence. The Waterwatch program has often been regarded as a community capacity building program, though there are currently efforts to lift the scientific integrity of the data collected through this program by implementing data confidence strategies (Elyse Riethmuller\(^7\) pers. comm.).

Increasing the efficiency, effectiveness and regional ownership of catchment water resource data collection is the key objective of the *Monitoring Partnerships Initiative* being implemented by DSE and its regional partners (DSE 2003d).

4.2 **Data management**

CMAs have the statutory role of reporting annually on regional catchment condition so have the task of aggregating data or information residing in the various NRM agencies. Up to now and for a range of reasons this reporting obligation has rarely been fulfilled; no doubt one significant obstacle is the disaggregation of catchment health information. With the development of regional RCSs, RCIPs and RMPs, the focus on reporting progress towards outcomes equally reveals an imperative to deal with the underlying natural resource data and information base.

The separation of statutory responsibility and the underpinning data required to deliver this poses significant dilemmas for the CMAs:

- do they rely on partner agencies delivering data or information that meets requirements at the appropriate times?, or
- do they invest in integrated internal databases that offer then greater control in data management? If so, what does this mean for potential duplication of activity?

Section 5 discusses open portals to data and information such as the *Victorian Water Resources Data Warehouse* and *Victorian Resources On-line*. These provide mechanisms access to fundamental (often raw) NRM data in addition to interpreted product. The question is to what extent can systems like these satisfy CMA data and information needs, and will they be developed to a point where institutional barriers to information will be sufficiently mitigated?

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\(^7\) Elyse Reithmuller (Wimmera CMA Waterways Manager) November 2004
Not unrelated to that discussed above is having a capacity to interpret data. This is not discussed in
detail here, but, clearly, the mechanism by which data is managed has implication for the means by which
it is turned into interpreted product. For instance, could control over data interpretation become less an
institutional activity and become more of a domain of a regional authority if data collection and
management become more regionalized?
5. **Reporting of catchment indicator data**

5.1 **Reporting requirements**

Reporting of project expenditure and outputs have been well entrenched at the regional level, with quarterly reporting cycles in place and the aid of tools such as Catchment Activities Management System (CAMS). However, there is increasing emphasis on the reporting of outcomes in relation to catchment health. As the national MFT and indicator framework is nearing operational status there is currently a focus on how this information might be reported.

5.1.1 **National reporting**

Annual progress towards the achievement of resource condition targets will be required for the Joint Steering Committee and the NRM Ministerial Council (NAP/NHT 2004). Reports on actual resource condition trends will be provided at least every five years as agreed by the NRM Ministerial Council in the *National NRM Monitoring and Evaluation Framework* (NRMMC 2003a).

The precise nature and timelines for reporting on the actual resource condition for each issue are still to be determined, though there will be consultation between the Commonwealth, Victorian NAP/NHT Programs Office, State data custodians, NLWRA and the CMA regions on this matter.

5.1.2 **MDBC reporting**

Each state has agreed to produce a consolidated Salinity Report Card for annual reporting to the MDBC of their tributary valleys contributing to the Basin. This is in relation to progress towards end-of-valley salinity, salt load and flow regimes (MDBC 2001b). The design of this report card will be the prerogative of the state. States or regions will decide on the extent of reporting of within valley targets. A program of rolling five year review and audit will occur that captures each valley and Commission Register entry.

5.1.3 **State reporting**

As indicated in Section 1.5.3 the VCMC has the responsibility to report every five years on the environmental condition and management of Victoria’s land and water resources through the VCMC Catchment Condition Report. Catchment condition reports have been completed for 1997 and 2002. An upcoming reporting requirement will be State of Environment reports by Victoria’s new Commissioner for Environmental Sustainability. The nature of this reporting is yet to be determined, but will obviously need to be cognizant of existing reporting structures.

5.1.4 **Regional reporting**

Catchment health reporting requirements of CMAs are outlined under the *Catchment and Land Protection Act*. The authorities are obliged to submit to the VCMC and Minister each year a report on the condition and management of land and water resources in its region and the carrying out of its functions. The exact guidelines and processes for achieving this remain to be developed and articulated.

5.2 **Reporting portals**

Increasingly data related to natural resource indicators and catchment health is being made accessible on the web. Briefly discussed below are a range of State websites that report a range of catchment information. Though more of a financial and activity reporting tool with limited user access CAMS is discussed for completeness. Other portals offer raw catchment data (e.g. Water Resource Data Warehouse), maps of natural resource information (Victorian Resources On-line) to consolidated statewide catchment indicator reporting (Victorian Catchment Indicators On-line)

5.2.1 **Catchment Activity Mapping System (CAMS)**

CAMS is a personal computer operated web based application to record and report on-ground activities implemented by landholders using incentives provided by DSE, DPI or CMAs (DSE 2003b). The principle intention is to capture expenditure of grants and incentives that can be reported back to regional, state or commonwealth authorities. CAMS went on-line in mid-2001 and is accessed by registered users in DSE, DPI and the CMAs across the state.
CAMS is a product of the Regional Data Net (RDN), an initiative of DSE to support the financial, technical and spatial registration of catchment protection and restoration works via the CMAs (DSE 2003c).

5.2.2 Victorian Catchment Indicators On-line (VCIO)

The Victorian Catchment Indicators (Section 2.2.2) and the data supporting them were released to the Victorian community through an interactive website launched in December 2001. The site, Victorian Catchment Indicators On-line (VCIO), has not been functional since owing to changing protocols and roles in statewide catchment condition reporting (Dugal Wallace8 pers. comm.) The development of the VCIO site was undertaken by DSE and PIRVic.

The site can be accessed as:

5.2.3 Victorian Resources On-line (VRO)

The Victorian Resources Online (VRO) site provides access to a wide range of natural resource maps and associated information. It has been a major component of the Victorian Resource Atlas project and in recent times has been supported by the State Government's Ecologically Sustainable Agriculture Initiative (ESAI). Information is organized at both Statewide and Regional (CMA) levels. A key mission of the site is to bring together the best available natural resources information and provided in user-friendly format. Though its major focus on map-based information it carries documents and links to a wide range of other Websites. It provides signposts to relevant hardcopy material, for example through its directory of soil and land survey information.

The site can be accessed as:

5.2.4 Victorian water resource data warehouse

The Victorian Water Resources Data Warehouse (VWRDW) is an external web site established to hold information on Victoria’s water resources. The site gives access to both raw and summary data on both water quality and quantity throughout Victoria, and is a central repository for published documents generated from the data.

The origin of the site is in the delivery of stream gauged data, with site layout and terminology consistent with this discipline. The site is progressively being adapted to deliver groundwater data.

Currently the VWRDW offers the following information capability:

- interactive maps for site selection (using the DSE MapShare facility)
- site information and time series records
- summarized data statistics
- basic data querying
- simple graphical representation
- downloadable published reports

In practice the common experience has been that the VWRDW is slow, cumbersome and non-intuitive. Its design and terminology clearly supports the presentation of surface water rather than groundwater data. It currently does not report on all bore site attributes and there is little explanatory detail on the data and its limitations. There is a recognition within DSE that the VWRDW is not adequately serving the needs of the public access to all water resource data. As a first step in its redevelopment an inventory of all related data and its custodianship is currently being collated (Greg Day9 pers. comm). Redesign will then occur to develop a more robust internet portal, but this will take several years to complete.

8 Dugal Wallace (Victorian NAP coordination) October 2004
9 Greg Day (Project Officer, Catchment and Water Division DSE) May 2004
6. **Regional Interviews**

6.1 **Purpose**
For satisfying the NLWRA obligations interviews were arranged for all CMA regions. The key information sought in these interviews relates to the:

- the status of NRM MER capability currently in place
- the alignment of this activity with the National Monitoring and Evaluation Framework
- how stakeholders assess their current MER in meeting their needs
- activities underway or planned to enhance MER capability, such as data collection and management
- additional needs in MER

The interview schedule is listed in Appendix 1.

6.2 **Design**
Prior to the interviews the interviewees were asked to provide any background information relating to MER that would be informative to the interviewer and assist in the efficiency of the discussion. Face to face interviews were arranged with nine CMAs and a phone interview with a tenth (Mallee CMA). If requested the interviewees were provided with a list of the interview questions. In some situations the CMA was more comfortable in providing a panel (of 2 to 5 members) for the discussion. In this situation it was felt that providing the list of interview questions beforehand would keep the interview adequately focussed. Most interviews were recorded on audio to assist maximising the information received. This also aided a more relaxed and conversational style of discussion.

During the course of the project there was the opportunity to interview representatives from other organisations involved in resource condition indicators such as DPI, DSE and a tertiary institution (Deakin University). In these circumstances the interview was tailored to match the perspective of the interviewee, but generally was more conversational.

The interviews generally varied between 45 minutes and 1.5 hours in length. The interview structure revolved around 4 categories and comprised 22 primary questions, as listed below. Most of primary questions contained a series of secondary questions that were there to assist in developing the discussion if this was needed.
6.2.1 Interview questions

Monitoring experience and strategies

1. What is your experience in relation to monitoring and targets?
2. Does your organization have a monitoring strategy?

Monitoring and business needs/models

3. What are the purposes of you organisation collecting NRM indicator information?
4. In general do you believe that the monitoring information being collected meets your business need?
5. Do you receive/budget adequate levels of resourcing for monitoring in your region?
6. What is the business model for your organization collecting or coordinating the collection of monitoring data?

MFT and other catchment indicators

7. Are there Matters for Targets and associated indictors in the National M&E framework that you don’t use or find difficult to implement?
8. Do you use other indicators than the ones in the National M&E framework?
9. Have you set RCTs for the MFT or other indicators?

Data collection, storage and management

10. How would you describe data collection procedures/practices in your region and are there any particular issues that you have?
11. What data storage and GIS platforms do you use and are there any particular issues that you have?
12. What would be your priorities in the development of additional technical capability in the collection, management, analysis or reporting of monitoring data?

Adequacy of MFT and broader discussion

13. In your view how well does MFT/indicators meet your needs at the regional scale?
14. What is the attitude of others both within the organization and across the region to MFTs/indicators?
15. How well do you think that you respond to state and federal reporting requirements?
16. Do you see what happens to the information after it is passed onto government investors?
17. Do you view how other regions or organisations are approaching the issue of monitoring?
18. What MER aspects would like the Australian Government and/or the state government to focus on to most effectively support your organization’s efforts?
19. Do you have any suggestions on how to leverage greater value from data collection?

Concluding questions

20. Are their any issues in particular that you would like the review team to follow-up or gauge in greater detail?
21. Is there someone else in the region that the review team should endeavour to talk to regarding the technical detail of indicators?
22. Do you have and questions or other issues to raise?
6.3 Consolidated interview findings

The following consolidated interview responses need to be contexted by the roles and expertise of respondents involved. The roles of interviewees varied widely between regions, comprising MER/monitoring coordinators, investment/strategic planning managers, program managers, project officers and GIS officers. For this reason care needs to be taken in comparing results from regional interviews. Regardless of the interviewee there is no guarantee that a view expressed exactly reflects a formal CMA position.

Consolidated interview findings are presented in Appendix 3. The principle conclusions generated from the CMA interviews can be summarized as follows:

Monitoring experience and strategies

1. There is a broad spectrum of progress of CMAs striving to establish a MER capability, from those that have investigated the full concept of MER and are actively developing (or have developed) an operational strategy, to those that are relying on existing frameworks embedded in their RCS and planning a MER strategy in the short to medium term.

Monitoring and business needs/models

2. Typically, the aim of CMA monitoring is to focus on resource condition measurement. This is so that CMAs can review progress of management strategies, test technical assumptions, set new priorities and report to stakeholders.

3. A lack of understanding of the nature and extent of monitoring within their regions is a significant reason why CMAs are unsure whether they are collecting sufficient information to report on catchment condition.

4. Most CMAs believe that their MER strategies will enable them to justify additional resources for undertaking ‘umbrella’ MER activities.

5. By and large the CMAs undertake or coordinate only a minor proportion of natural resource monitoring happening across their regions. They are required to harvest large amounts of data or knowledge from other agencies to be able to report on catchment condition.

6. CMA regions have significant concerns in bridging gaps in baseline mapping, let alone providing for cyclical monitoring to measure progress towards targets.

MFT and other catchment indicators

7. Most CMAs have been able to cross-link the MFT framework to their existing regional catchment strategies.

8. There is reasonable satisfaction with the theoretical list of MFT indicators, but significant problems in applying a number of these, more particularly the soil condition MFT, estuarine and coastal MFT, significant native species/communities MFT and wetlands indicators.

9. CMA regions offer a range of views on the need for socio-economic indicators, some simply considering them in relation to impacts or effects on the MFT indicators, whilst others believing that a developed set of socio-economic indicators is central to support their role.

10. There are strong concerns about the quality and extent of information underlying many of the resource condition targets, so that they are often referred to as ‘interim’, or admitted to be vague or ‘aspirational’ in nature.

Data collection, storage and management

11. Many of the CMAs believe that data collection within their regions is fragmented, ad hoc and poorly catalogued.

12. CMAs appear happy for monitoring expertise to reside in the other monitoring agencies where these skill bases have historically developed.

13. A number of CMAs are already or plan to develop IT strategies in order to enhance the coordination and quality of their data management and reporting capability. This may mean establishing sophisticated, integrated natural resource databases in-house.
14. Internal data management and GIS capacity tends to be vested with project officers, and usually involves usage limited to project development and management rather than high level technical usage.

Adequacy of MFT and broader discussion

15. A significant number of CMAs mention that they have uncertainty in understanding the MFT framework and its language, though some recognise that it is early in the establishment of the framework.

16. CMA boards and senior management are typically outcome driven and strongly supportive of MFTs and indicators (or their surrogates), though implementation or project staff are often more driven by the delivery of outputs (the latter regarded as being quite acceptable if there is a process in place for linking output to outcome).

17. CMAs typically believe they report adequately on investor requirements, but it is generally out of obligation rather than a sense of value or effectiveness.

18. Historically CMA reporting has been about activity and output though the need for outcome reporting is widely recognised. CMAs are generally frustrated by the lack of coordinated standards and guidelines for reporting progress towards natural resource outcomes.

19. CMAs are invariably dissatisfied by the amount or speed of feedback that they receive following reporting to investors.

20. The vast majority of CMAs observe MER development activity of other CMAs, though currently there is no formal statewide mechanism to stimulate the interchange of ideas.

21. There are few areas where CMAs do not believe that they would be significantly assisted by the state or commonwealth taking leadership in the development and implementation of a sound and coherent MER capacity.

22. The CMAs have a broad range of ideas where government should focus its MER support, amongst the highest on the list being leadership, engagement and clarity of rationale. This is in addition to the development of standards and the provision of resources for MER.
6.4 Matters for Targets and Indicator comment

6.4.1 MFT and Indicator issue tabulation

Table 3 tabulates the issues associated with National Matters for Targets and Indicator framework that emerged during the regional interviews. Some attempt is made to quantify the number of times a particular issue was raised. This should be used as a guide only, as a lack of response need not necessarily mean that an issue does not exist. Every question about every indicator was not asked all of the time; rather, the question usually posed was what particular issues a CMA had with the MFT Indicator Framework. A variation in response can also be expected given the range of CMA respondents interviewed.

In Table 3 an overall MFT rating is also attempted based on the collective degree of issue in applying it across the CMA regions. This does not take account of relevance that, for some MFTs, can vary widely from one region to another (for instance the Estuarine, Coastal and Marine Habitat MFT).
<table>
<thead>
<tr>
<th>Matter for Target</th>
<th>Indicator Heading</th>
<th>Indicator</th>
<th>Indicator specific comments</th>
<th>no. raised</th>
<th>General comment</th>
<th>Issue rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land salinity</td>
<td></td>
<td>Depth GW</td>
<td>Insufficient monitoring in low relief landscapes</td>
<td>Sev.</td>
<td>General comment: - existing levels of monitoring not always adequate if targeting priority areas</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Insufficient monitoring when resolving to priority areas or priority GFSs</td>
<td>Sev.</td>
<td>- coordination difficult where multiple agencies involved in monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not practical for monitoring perched watertables.</td>
<td>One</td>
<td>- groundwater depth mapping difficult in low relief landscapes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GW salinity</td>
<td>Irrelevant in high salinity groundwater landscapes</td>
<td>One</td>
<td>- salinity mapping is expensive</td>
<td></td>
</tr>
<tr>
<td>Soil condition</td>
<td></td>
<td>Soil acidification</td>
<td>Not a significant issue in NW Victoria.</td>
<td>Sev.</td>
<td>One of the MFTs with most-mentioned deficiencies, especially relating to acidification and carbon indicators</td>
<td>VHigh</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil erosion – water</td>
<td></td>
<td></td>
<td>- insufficient cross-catchment baselining</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil erosion – wind</td>
<td></td>
<td></td>
<td>- insufficient soil condition monitoring</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soil carbon content</td>
<td>Lack of practical methodology. Little or no data collected.</td>
<td>Most</td>
<td>- no consensus on soil health parameters</td>
<td></td>
</tr>
<tr>
<td>Native vegetation communities’ integrity</td>
<td>Extent of priority type by IBRA sub-region</td>
<td>Extent of priority type by IBRA sub-region</td>
<td>Bio-region definition lacks resolution</td>
<td>One</td>
<td>- there is a need for an index of soil condition</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extent of present type by IBRA sub-region</td>
<td>Accuracy of mapping poor outside of RFA areas</td>
<td>One</td>
<td>- soil sodicity/structure more important in some regions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>% of pre-Euro extent by type by IBRA sub-region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td></td>
<td>% condition class by type by IBRA sub-region</td>
<td>Measurement of condition is more of an issue than extent. Insufficient data to accurately describe. Habitat Hectare approach designed for isolated remnants, not large park areas</td>
<td>Most</td>
<td>General comment: - resource intensive to accurately baseline</td>
<td>High</td>
</tr>
</tbody>
</table>
### Inland aquatic ecosystems integrity

<table>
<thead>
<tr>
<th>River condition</th>
<th>Benthic macro invertebrate community assemblages</th>
<th>Uncertainty in robustness (especially as in link between measurement and waterway health)</th>
<th>Many</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish community assemblages</td>
<td>Issue based or selective monitoring at best.</td>
<td></td>
<td>Many</td>
</tr>
<tr>
<td>Benthic diatom community assemblages</td>
<td>Expensive</td>
<td>Uncertainty in link between measurement, impact.</td>
<td>Sev. Sev.</td>
</tr>
<tr>
<td>Riparian vegetation community assemblages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riverine physical structure and in-stream habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water quality</td>
<td>Analysis of N not well-developed.</td>
<td>One</td>
<td></td>
</tr>
<tr>
<td>Hydrology</td>
<td>Difficulty defining effective indicators for ephemeral streams</td>
<td>Sev.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wetland extent</th>
<th>Extent of regionally significant wetlands</th>
<th></th>
<th>Mod</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Wetland ecosystem condition</th>
<th>Colour</th>
<th>Uncertain of significance</th>
<th>One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved oxygen and temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extent of inundation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macro invertebrate diversity</td>
<td>Uncertainty in robustness (especially as in link between measurement and waterway health).</td>
<td>Many</td>
<td></td>
</tr>
<tr>
<td>Macro invertebrate index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macro invertebrate indicator species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transparency</td>
<td>Uncertain of significance</td>
<td>One</td>
<td></td>
</tr>
<tr>
<td>Vegetation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phytoplankton</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is widespread adoption of indicators that relate to the Index of Stream Condition (ISC). ISC generally well accepted, but some issues raised:
- ISC formula is changing, only done every 5 years
- non-alignment of the timing of collection of some indicators
- currently unable to resolve ISC to local level e.g., for shires or priority areas
- difficult to employ where streams are ephemeral
- not good for measuring water quality trends

**General comments:**
- measurement of quality much more problematic that extent
- wetland information is generally light-on
- no agreement on indicator protocols, though state projects underway to develop these
- ‘wetland condition index’ is currently being developed
- cannot readily apply where wetlands are ephemeral
### NRM monitoring, evaluation and monitoring in Victoria – regional perspectives

<table>
<thead>
<tr>
<th>Habitat extent</th>
<th>Extent</th>
<th>Condition</th>
<th>Lack of indicators and baseline data</th>
<th>Many</th>
<th>General comments on this MFT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estuarine, coastal and marine habitat</td>
<td>Habitat condition</td>
<td>Condition</td>
<td>Lack of indicators and baseline data</td>
<td>Many</td>
<td>- not relevant to northern CMAs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- ecosystems poorly understood</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- poor baseline data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- no guidance on indicators, protocols or target setting principles</td>
</tr>
<tr>
<td>Nutrients in aquatic environments</td>
<td>Nitrogen Total N and flow leaving (sub) catchment</td>
<td>Analysis of N needs to be further developed</td>
<td>One</td>
<td>VLow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phosphorous Total Ph and flow leaving (sub) catchment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbidity and suspended particulates in aquatic environments</td>
<td>Turbidity or TSS and flow Lesser relevance in lowland rivers</td>
<td>One</td>
<td>VLow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salinity in fresh aquatic systems</td>
<td>In-stream salinity TDS and flow or EC and flow</td>
<td>TDS preferred technically, but communities engaged with EC</td>
<td>One</td>
<td>VLow</td>
<td></td>
</tr>
<tr>
<td>Significant native species and ecological communities</td>
<td>Extent, conservation status Range area and location of species</td>
<td>Information is sparse</td>
<td>Sev.</td>
<td>High</td>
<td>General comments on this MFT:</td>
</tr>
<tr>
<td></td>
<td>Key species habitat extent, condition Information sparse on condition</td>
<td>Most</td>
<td></td>
<td>- setting of targets should be a multi-regional activity due to scale of issue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Species relative abundance Information is sparse</td>
<td>Sev.</td>
<td></td>
<td>- few targets set</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extent of ecological community Information is sparse</td>
<td>Most</td>
<td></td>
<td>- higher quality information on public land and along rivers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Condition of ecological communities Information is sparse</td>
<td>Most</td>
<td></td>
<td>- given limited resources emphasis should be on habitat rather than individual species</td>
<td></td>
</tr>
<tr>
<td>Ecologically significant invasive species</td>
<td>Marine Presence of exotic species</td>
<td></td>
<td></td>
<td></td>
<td>General comments on this MFT:</td>
</tr>
<tr>
<td></td>
<td>Presence of native pests in ports/harbours</td>
<td></td>
<td></td>
<td></td>
<td>- baseline is limited as historical emphasis has been on compliance</td>
</tr>
<tr>
<td>Vertebrate (non marine)</td>
<td>Reduction in impacts Measurement of ‘impact’ is difficult Historically compliance rather than mapping approach (lack of quantitative baseline) One</td>
<td>One</td>
<td></td>
<td></td>
<td>- little progress on invasive marine species</td>
</tr>
<tr>
<td>Terrestrial weeds</td>
<td>Extent and density of weeds under control programs Historically compliance rather than mapping approach (lack of quantitative baseline) One</td>
<td>One</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.4.2 Compilation of thoughts and anecdotes

Below is a listing of individual comments and anecdotes that were received during the interviews. These indicate a variation in views, but also highlight a number of common issues and frustrations.

Attitudes to MFTs and Indicators

- The regional focus on delivering outcomes is ultimately the driver, and in this backdrop the MFT and indicator framework becomes irrelevant
- The MFT list appears to be a comprehensive one, but, is ultimately one for the scientists to assess
- It seems to be a reasonable mix of environmental criteria
- Good, project managers now see them as useful
- The list is OK but needs to recognize the practical limitations when applying to catchments
- Time needs to be devoted to MFT to put them into practice
- The extent of data does not fully reflect the framework, so provides a questionable picture of catchment health
- Not sure whether measuring MFTs will indicate the differences being made at catchment level
- There is a level of difficulty with most indicators
- It takes time to ‘get your head’ around them
- Attitudes have changed significantly since RCS development to one of alignment with national frameworks
- Boards and senior management focus on outcomes an therefore are supportive of MFTs
- Implementation staff are often more concerned with outputs than outcomes
- MFT means little to regional people apart from those involved in RCS development
- MFT language is not part of the regional language, process or mindset

Communication and responsibilities within the National M&E Framework

- Communication has not been good enough
- Lost interest in the National M&E Framework owing to lack of feedback
- Do not see reasons for collecting information
- Collecting a lot of information but doing little with it
- MFT are another check box to tick
- Most people don’t know what they are
- Why have the MFTs been introduced and what is their background?
- Not concerned with limitations of the individual indicators, but with the MFT approach as a whole
- There is some uncertainty about the state’s emphasis on MFT and Indicators
- State rather that regions needs to deal with commonwealth on the finalized indicator protocols
- State and commonwealth are more interested in process than NRM
- Regional stakeholders tend not to relate more to the language of RCTs than MFTs
Deficiencies in the framework

- There are many gaps in MFT
- Distribution of indicator monitoring does not map well at the scale of priority areas
- MFTs do not relate well to people, social issues or capacity building
- There is not enough focus on social information (as it relates to catchment condition indicators)
- Need to broaden the definition of 'good' information
- Need to combine historical information, anecdotes and research outcomes
- Ascertaining condition much is more difficult than extent
- State programs talking a different language to MFT. MFT not yet adopted through programs.
- Regions need to be involved in discussions about indicators and targets
- Do not have a strategy to collect MFT information
- Regional report cards vaguely relate to MFT
- Some indicator reporting questions are ill-informed
- There is nobody at regional level able to report to the level of complexity demanded
- Need to understand and relate reporting to RCT time scales
- There is generally a greater appreciation of RCTs than MFTs and Indicators
7 Regional progress towards catchment health monitoring

Below is a summary by CMA of information recorded during the regional interviews and subsequent follow-up. Note that this does not capture every aspect of the interview, but aims to encompass the principle approaches/attitudes to catchment health monitoring and the MFT Indicators. Importantly, the summarized views are taken from individuals working within the CMA organizations and so may not exactly match the broader organizational view.

7.1 Corangamite CMA

The Corangamite CMA is aiming to develop a Draft MER strategy by May 2005. A framework and process for building an overall monitoring and evaluation framework exists for the region, developed to measure progress towards meeting targets in the implementation of the RCS (CCMA 2003). The CCMA employs a dedicated Monitoring and Evaluation Coordinator.

NRM indicator information is collected for a range of purposes, but assessing resource condition and its changes is a significant objective. The CCMA board is strongly supportive of the use of catchment health indicators and recognises the need to move from reporting on outcomes rather than just outputs.

The MFT Indicator approach is regarded positively, though it is recognised that there are significant limitations in its practical application. Particularly noted is the poor extent of baseline data to meet the Soil Condition MFT, in addition to the inadequacy of data and protocols to meet the Estuarine Coastal and Marine MFT. The CCMA RCS is heavily predicated on implementation in priority areas, so, that even for the better data endowed indicators (e.g. Land Salinity MFT indicators, River Condition indicators), the resolution of this data at priority area scale is questioned.

There is some optimism that the implementation of monitoring partnerships between DSE and the region will streamline monitoring and allow the region to have some control in the operation of surface water and groundwater monitoring programs. Standardisation and alignment of government reporting requirements are felt to be significant areas where State and Commonwealth agencies can invest additional effort.

7.2 East Gippsland CMA

The EGCMA is part of the MERGe initiative (Section 2.3.2) that will lead to the development of a MER Plan. It is intended that the MER Plan will include RCTs and address the National NRM Standards & Targets & M&E Frameworks. There are no resources for a dedicated individual coordinating MER within the organisation so there is minimal attention given to this. The main focus in East Gippsland has been on monitoring and reporting, with little attention to evaluation.

Monitoring occurring across the region is fragmented and without overall coordination. Data access is a problem. For instance the Water Monitoring Partnership in Gippsland is collecting and storing a lot of information in the Victorian Water Resources Data Warehouse, but extraction of it as a useful form is problematic. It is recognised that there is a significant difference between indicator data and then generating an interpreted product of genuine use.

The MFT Indicators have a relatively low profile in East Gippsland due to the stage of RCS development and the fact that they have not been effectively communicated. Generally there is no current strategy for collecting MFT information in the East Gippsland Region. Significant data gaps are recognised to impinge upon the effective operation of the MFT Indicator Framework. For instance the Estuarine, Coastal and Marine Habitat MFT is a relatively new consideration for the CMA and data is only just beginning to be collected. Social issues are poorly represented in the MFT Indicator Framework.

The EGCMA would like to understand the State and Commonwealth rationale for the standardisation of indicators, and that there be recognition of the role of regions being engaged in the process of developing protocols and standards.
7.3 Glenelg Hopkins CMA

The GHCMA is planning for a MER strategy to be completed in 2005. Limited catchment condition monitoring is directly undertaken by CMA, most of this relies on regional and state partners. A significant reason given for monitoring is to measure progress towards catchment condition. There is a significant task to catalogue catchment monitoring activity/data as an initial focus in a formalised MER program.

The MFT Indicator approach is regarded as reasonable, though the current availability of catchment condition data adequately reflect it. The GHCMA board strongly supports the use of catchment health indicators and targets. It recognises the need to move from reporting on outcomes rather than simply outputs. In contrast CMA project staff tend to be focussed on outputs.

Baselining is regarded as a key issue for all the MFT Indicators, even for the better described indicators such as groundwater depth and the extent of groundwater discharge. Addressing the Estuarine, Coastal and Marine MFT is in its infancy. Dealing with baselining and monitoring of catchment health indicators is as much a resourcing issue as it is a technical one.

The GHCMA has recently developed the alignments between its RCTs and adopted indicators with that of the MFT framework. The region GHCMA also expended significant effort in developing methodologies and then setting the region’s RCTs. To this end the GHCMA commissioned SKM and Regional Innovations to carry out a project ‘setting resource condition target and sustainability indicators’ in 2002/03. This identified 15 natural assets types and 46 sustainability indicators in the region.

The GHCMA is a partner with Deakin University in the South West Regional Sustainability Project (Section 2.3.3).

There is a sense that the region in developing their MER capability would be assisted if more leadership and engagement from governments occurred.

7.4 Goulburn-Broken CMA

The GBCMA has a strong commitment to MER, with a culture of MER within the region having been in place for several decades. This is despite the absence of guidelines or processes for developing such strategies. Catchment condition indicator information is collected for implementing the RCS, though, in reality, much effort is spent on preparing information for investors but only with a vague purpose.

The GBCMA believes that MER is a component of the role of all program managers (and projects) rather than one rests with an individual. The GBCMA comprises significant combined experience in catchment monitoring.

Given its own maturity with NRM MER the GBCMA has not seen a need to particularly embrace the MFT Indicator Framework. It sees the importance of a planned, internally coherent process. Few people within the organisation have an understanding of MFTs, though, nonetheless they are outcome target focussed. When cross-referenced, the GBCMAs ‘local’ and ‘regional’ indicators overlap reasonably with the MFTs. The most problematic indicators in the region relate to soil condition, significant native species/habitat and water quality (N). It is felt that not all MFT are of equal relevance in the region. An issue of concern is the ability to be able to track land use and land management change and then to define its relationship to resource condition.

The GBCMA is taking a long term, adaptive approach to setting and then redefining targets, and aiming to minimise the impact of less meaningful external demands. It understands that reporting to multiple stakeholders needs to be made more efficient as there are many stakeholders who require reporting each with very different requirements. It might be better to invest in fewer more strategic indicators rather than trying to be too-encompassing, or that rapid assessments might be a useful area to investigate.

The GBCMA has a strong relationship with PIRVic, G-MW and local consultants in order to assist with data management and analysis.
7.5 Mallee CMA

The Mallee CMA has a Monitoring and Evaluation Framework (separate to the RCS) though it is not widely used. A recent review has been undertaken the monitoring networks, practices and contractual arrangements across the MCMA region. The MCMA has a dedicated monitoring coordinator. The limited monitoring managed or co-ordinated by the MCMA is outsourced by contract (aside from Waterwatch).

The MFT Indicator approach is accepted as a solid basis for monitoring catchment condition though it is also recognised that there are significant limitations in its practical application. There is some concern about the applicability of aquatic related indicators to this region owing to the ephemeral nature of water bodies. The disposition for naturally saline groundwater and surface water bodies means that some of the indicators are irrelevant. Similarly, most of the soil condition indicators lack relevance. The lack of baseline information is seen as a primary concern across most of the MFTs. Data relating to the condition of terrestrial vegetation, species and communities is particularly sparse.

During the last 12 months the MCMA have progressively developed a series of catchment condition reports based on the graphical VCMC report card approach.

Timely and consistent access to reliable catchment data is a significant issue to the MCMA. It relies on partners and internet data portals, and currently has no plans for developing an integrated catchment monitoring database. Some work is required in cataloguing and managing received data.

7.6 North Central CMA

The NCCMA have recently approved tender documents for a regional MER strategy that is expected by June 2005. This will be assisted by the NCCMA’s dedicated monitoring and evaluation coordinator. An electronic catalogue for capturing the detail and purpose of natural resource monitoring across the region has been designed and is likely to be implemented. This will also assist in understanding the fragmented monitoring activity data stocks residing within the NCCMA.

Natural resource data collected through monitoring programs is primarily sought to assess changes in catchment condition and to test technical assumptions. This data is usually sourced through partners though the NCCMA coordinate an amount of vegetation related mapping.

The MFT Indicator Framework has been embraced across the organisation. The NCCMA board and senior management is supportive of catchment condition monitoring and measuring outcomes.

Some difficulties exist in the MFT indicators, for example fish communities are not routinely monitored. Soil condition poses some problems in relation to the availability of baseline data. There are methodological concerns for indicators such as soil carbon (Soil Condition MFT) and macro invertebrates (Inland Aquatic Ecosystems Integrity MFT). Often cost and time are more of an issue than technical considerations.

Climate is an additional catchment health indicator adopted by the NCCMA.

A suggestion was that a useful statewide resource would be a catalogue of catchment monitoring and research reports that would be freely available. This would assist the ability of region’s to source material beyond its boundaries.

7.7 North East CMA

The North East CMA is developing a MER Plan that is anticipated to be completed in April 2005. It is intended to be a practical, operational plan. To date the NECMA has developed a draft working document describing the basis of a MER strategy (NECMA 2004b). The NECMA has enlisted the assistance of BRS to provide an overview role in the development of its MER strategy.

The NECMA sees evaluating and renewing its RCS as an important reason for monitoring. It has a strong focus on adaptive management and assumption testing (for instance between output and outcome), as well as reporting to its various communities. The vast majority of catchment health monitoring in the NECMA region occurs via regional partners, and sees that it has a primary role in physically aggregating this information into a single data system. Partly to this end the NECMA is developing an IT strategy.
The MFT Indicator Framework appears relatively comprehensive. The Soil Condition MFT is a major problem due to a lack of adequate baselining and monitoring capability (cost prohibitive), yet is a high community priority. The NECMA is committed to meeting the Index of Stream Condition (ISC) component of the set of MFT River Condition indicators. It is awaiting for the emergence of wetland condition protocols being developed by the State. Further issues cited were the cross-regional perspective of setting targets for native species and ecological communities (it’s not really appropriate for a region to set these), and the difficulty in measuring the Reduction in Impacts Indicator relating to invasive species.

The NECMA Board has a strong belief in reporting outcomes and has engaged in the National MFT and Indicator framework. Increasingly the organisation is become outcome focused, though there is concern about the ultimate reporting requirements of state and federal jurisdictions. It is felt that leadership and engagement from these authorities would help clarify this uncertainty and ensure some consistency in standards.

The scaling of indicator reporting is seen an issue not just in aggregating to more generalised reporting, but also in the other direction in order to be able to work to the scale to complement the efforts of local authorities such as shires.

### 7.8 Port Phillip and Westernport CMA

The concept of NRM MER is evolving in the PPWCMA region though there are currently limited resources to implement a substantial program. MER is discussed as a chapter within the RCS (PPWCMA 2004).

The stock of natural resource data across the PPWCMA is deficient compared to many other regions. This leads to difficulties in effectively measuring progress towards RCTs. There remains to be comprehensive assessment of this data that not only resides in large organisations like Melbourne Water and the EPA, but also large number of local government authorities. Environmental priorities in the region are large driven by the need to plan urban development.

Engagement of the PPWCMA with the MFT Indicator Framework remains to be advanced. Despite the embedded language being overly bureaucratic, MFT nonetheless represents a starting point in catchment condition monitoring. Data on soil condition is a significant gap in the PPWCMA region even though this information is ideally sought for demarcating urban growth boundaries from high value agricultural land. Wetland data is another information gap in this region, though stream water quality data is of a high standard. The management of groundwater monitoring is unnecessarily complex.

Monitoring methodologies are generally regarded as adequate but specialist support is required to interpret and undertake. There will be additional requirement for technical expertise into the future, much of this will likely to come from external providers. The PPWCMA has a close working relationship with Melbourne Water. Data management has not been a significant consideration for the PPWCMA but it is looking at opportunities to improve this. One model for data management being looked at is that of the Moreton Bay Waterways and Catchment Partnership.

One suggestion offered to advance MER within the regions is to periodically spend short concentrated efforts on collating and organising natural resource data. Perhaps this could be done with the assistance of a squad that progressively rotates around the CMAs, which would also have the benefit of translating learnings between regions.

The PPWCMA would invite greater personal engagement from the State and Commonwealth on MER.
7.9 West Gippsland CMA

The WGCMA is a party to the MERGe initiative (Section 2.3.2) operating across Gippsland. This will lead to the development of a MER Plan that is intended to include RCTs and address the National NRM Standards & Targets & M&E Frameworks. The WGCMA have funding for a part time MER role. Some long term natural resource monitoring experience resides within the authority. The current levels of resourcing of MER activity are inadequate, however it would not be appropriate to see funding redirected from on ground works into MER.

West Gippsland has conducted an information management review to attempt to improve the way this currently operates in the region. Data management is currently quite fragmented in this region. Information collected through monitoring is used and analysed for the development of RCS and sub strategies. It is used to set priorities for actions. Most of the monitoring occurs through state run programs. The WGCMA itself does not collect much natural resource data, much of that required is sourced from DSE.

Communication of MFT to the WGCMA region has been sadly lacking especially relating to their actual context (for instance, they don’t seem to fit with state run programs). On these grounds it is difficult for regions to develop a sense of ownership with them. Regardless, it is important that the definition of ‘good’ information is broad enough to encompass historical information and narratives. Intrinsically the MFT Indicator appears okay but it needs to engage technical people within the region. It is however important to determine the key indicators for catchment health in this region as there are an endless list of potential indicators.

There are a number of practical considerations with the MFT Indicators. For instance, what is the consensus on the components of soil health? Further work is needed to develop indicators and assessment methodologies for wetlands and estuaries. Measuring condition and quality is much more difficult than measuring extent. There also needs to be improved indicators to reflect social aspects of NRM. Indicators are also sought on air quality and significant landscapes.

A concern is the difficulty in determining the relationship between management action and outcome as there are many factors potentially impacting upon catchment health.

7.10 Wimmera CMA

The WCMA has been awaiting state solidarity on MER requirements before proceeding with its own strategy. The WCMA does not have a dedicated MER officer, but an internal monitoring and evaluation working group has been formed to guide developments in this area. This working group, strongly supported by WCMA program managers and delegates is coordinating the:

- WCMA Monitoring and Evaluation Strategy Working Draft (in progress)

The first Draft of WCMA Monitoring and Evaluation Strategy is scheduled for May 2005.

The bulk of monitoring activity managed by the CMA is sub-contracted, though there is a culture developed for project staff to be closely associated with all aspects of these sub-contracts. Community also plays a significant role in monitoring across the region. The WCMA has a number of unique approaches to monitoring catchment condition. This includes entrenched programs such platypus and bird monitoring that are used as measures of catchment biological health.

The MFT Indicator approach (and at board level at least the aspiration for catchment indicators) is accepted by the organisation, but reservations remain about the language describing the framework and the lack of engagement from the Commonwealth. A significant practical challenge to adopting the Inland Aquatic Ecosystems Integrity MFT is the highly ephemeral nature the region’s aquatic systems as well as the highly regulated nature of its primary waterways. An approach that the CMA has used to help baseline its waterways and wetlands is by undertaking geomorphological studies. Limited baseline data is seen as a major limitation for many of the proposed indicators, not the least data relating to soil condition and terrestrial biodiversity. The current Soil Condition MFT indicators are questioned as to their appropriateness for characterising soil health.
As a large proportion of its natural assets (e.g. wetlands) lie on private land the WCMA invests heavily in understanding socio-economic trends across its region. The WCMA recognises the need for specific engagement processes that are amenable to the significant landholder base with which it deals.

The WCMA sees itself having a primary role in facilitating catchment health data collection, management, interpretation and dissemination. Further, it envisages a significant role for GIS in communicating catchment condition to its investors and its local communities.
8 Consolidated regional findings and discussion

8.1 NRM MER capability currently in place in the Victorian regions
Three of Victoria’s CMAs regions (Corangamite, North Central and Mallee) have full-time dedicated MER or monitoring coordinators with these roles typically established within the last 12 months. Two CMA respondents in particular claimed significant natural resource monitoring experience. Several CMAs are challenged by high staff turnover and loss of expertise (sometimes to other CMAs).

Three CMA respondents (representing Goulburn Broken, East and West Gippsland) report that they have completed or are advanced with ‘working’ MER strategies, whilst most of the remainder have plans for their development by mid-2005. One respondent reports that their CMA has a monitoring and evaluation document that is not used. The need for MER is usually cited within RCS documents with some regions having a basic ‘framework’ embedded.

The three CMAs with advanced MER development and have engaged in a degree of high level analysis of MER within NRM context. As a result these regions feel an allegiance towards their own MER Strategy. Only one CMA currently has a fully costed MER plan. Regions that are particularly proactive in developing MER capability tend to be frustrated by the inaction of government in developing sound processes, and maintain strong belief in their own MER processes that they have developed (or developing).

The complexity in catchment condition related MER appears to be understood by all CMAs. There are a range of reasons why CMAs are experiencing difficulty, amongst them being:

- it is a constantly evolving process. There is lack of clarity in State and Commonwealth rationale, requirements (and alignments).
- there appears to be a lack of leadership and engagement from government agencies in the development of clear rationale, protocols and standards. There is not an agreed framework for reporting catchment condition.
- the diversity of catchment monitoring activity across a range of organizations in a given region is not understood and catalogued, nor coordinated
- reporting has traditionally been about outputs and project activities, but adjustment is now required to report on outcomes in catchment condition
- the degree of implementation of broad-based catchment condition MER (as opposed to within project MER) is strongly dependent upon resourcing
- evaluation and feedback loops are not well established
- there is often little understanding of why and what happens to information requested by Commonwealth and State agencies, and therefore little confidence in what is provided

8.2 Regional alignment with the Matters for Targets and indicators
Given their previously existing RCS strategies CMAs have tended to cross-link the MFTs and indicators with the language of their own strategies. Most CMA survey respondents indicate that they believe that this has been done reasonably effectively. It is generally felt that the nationally agreed indicators will become more explicitly absorbed with the gradual renewal of plans and through the processes of adaptive management. The notion of catchment condition indicators is well entrenched within the CMAs, though the language of RCTs is often used rather than MFT per se (for instance at Board level).

Several CMA respondents indicate that they are less actively engaging in the National Monitoring and Evaluation Framework owing to frustration in the delivery of standards and protocols. Some CMAs question the whole MFT approach in relation to understanding its ultimate purpose and find the bureaucratic language used to describe MFTs and indicators unnecessarily complex and confusing. Some of the uncertainty or lack of confidence revolves around:

- the framework yet to be adequately tested
- the framework being poorly communicated (and CMAs have had no input into its development)
• lack of clarity and confusion in terminology (e.g. not helped that the term ‘target’ appears in a number of different contexts such as RCT, MFT, MAT)
• uncertainty as to how it aligns with state requirements (such as SOE)

In general there is reasonable satisfaction with the theoretical list of indicators (i.e. as an aspiration), but significant difficulty is expressed with respect to their application. These difficulties revolve around technical, time and cost issues. Lack of adequate baseline information (and associated with this a lack of secure investment in ongoing catchment monitoring programs) was a ubiquitous response. Often mentioned also is that measurement of MFT condition is much more difficult than extent.

Roughly in order of decreasing prominence, regions have collective issues with the following MFTs and respective indicators:

• Soil condition MFT, where there are significant gaps in baselining and the absence of satisfactory ongoing monitoring programs (especially acidity and carbon content), in addition to methodological issues (especially soil carbon). The appropriateness of the current suite of MFT soil condition indicators is strongly questioned.
• Estuarine, coastal and marine habitat MFT, where indicators are not well-developed and there is a significant lack of baseline data.
• Significant native species/ecological communities MFT, where indicator protocols are not finalized, and whether targets and monitoring should be determined on the basis of regional boundaries. Should the emphasis be on habitat or individual species?
• Wetland condition indicators, where there is no agreement on indicator protocols (in the context that a number of wetland strategies are still being developed). Where wetlands are ephemeral there needs to be consideration of the influence of wetting and drying cycles on condition indicators.

Some particular issues raised in relation to MFT Indicators:

• Groundwater depth: a fuller understanding of groundwater depth baselines is required in some regions and this translated through to realistic RCTs. Also, groundwater monitoring often does not align with priority groundwater flow systems (GFSs) that is a contemporary driver for monitoring
• River condition: MFT is embraced in so far as it interfaces with the State ISC requirements. There is concern at the relationship between macro-invertebrate and diatom measurement and aquatic condition. Ephemeral waterways create addition complexity.
• the difficulty in the measurement of ‘reduction of impact’ in relation to weeds and pests

Issues relating to specific MFTs and MFT Indicators are outlined in more detail in Table 3.

On a more general note the following issues are raised:

• the distribution of measured indicators may be sufficient to describe regional circumstances, but are insufficient to describe a region’s priority areas (that is sometimes a clear direction in an RCS)
• not all MFTs are of equal relevance
• progress towards resource condition targets is not necessarily linear and reporting requirements need to respect this

The data inadequacy issue is a significant one, and is also reflected in the comments received in RCT setting. Despite respondents indicating that they have set RCTs for most of their catchment indicators, some of these are regarded as interim until more (or quality) data is received or there is greater technical understanding of the indicator. Some respondents admit that a number of their RCTs are obscure, almost aspirational in nature. There are some strong concerns in the assumptions used in developing targets and the ability to measure them.

Most CMA respondents believe that their Boards and senior management strongly support catchment indicators (Boards tend not to be conversant with MFT per se) especially as they are now focused on trying to deliver outcomes. A different attitude can reside with project implementation staff whom may be
more preoccupied with project outputs than MFT outcomes. Communication with partners on resource condition seems not to be based so much on MFTs, but couched more so in the language of RCTs.

8.3 The current effectiveness of MER in meeting regional needs
CMAs are increasingly focusing on outcomes in natural resource condition as being the primary measure of their performance. Measurement of outcomes is acknowledged by CMAs to have shorter term benefits including:

- monitoring the implementation of an RCS or underpinning strategy
- to be able to test assumptions and apply adaptive management (for instance developing updated plans and resetting priorities)
- report to investors and stakeholders on catchment condition

Reporting, however, still largely revolves around outputs and activities than outcomes or progress towards targets. The transition to effective outcome reporting still lies ahead for most regions. This needs to be assisted by agreed Regional/State/Commonwealth catchment condition reporting guidelines.

From a monitoring standpoint most CMA respondents believe that catchment condition MER is at best being only partially met. Amongst the reasons for this are the:

- lack of baseline information or monitoring across a region
- the uncoordinated or ad hoc nature of monitoring occurring across a region
- uncertainty of the nature of monitoring occurring across a region
- the difficulties in accessing data
- that data is collected by a mix of tools which are variably applied (i.e. lack of consistency)

8.4 Regional technical capacity to support the development of MER
A significant challenge amongst the CMAs is the number of organizations involved in gathering information needed for assessing catchment health. CMAs are the principal mechanism for reporting on regional catchment health yet they only undertake a minor proportion of catchment monitoring themselves. The ability for them to effectively report on catchment health requires efficient transfer of information between different agencies, that often proves cumbersome. CMA respondents highlight their respect for the roles and expertise of these other agencies (often referred to as partners); nevertheless a significant issue raised in this review is that natural resource data collection within a region largely remains poorly understood and coordinated. The cataloguing of this information is a priority for a number of CMAs alongside the development of their MER strategies.

There are varied responses to the robustness of data collection methodologies, though an underlying theme is that there is a level of trust and responsibility placed in the relevant collection agency. There is common recognition that a number of the MFT indicator protocols still need refinement and that there needs to be leadership and engagement from government agencies to achieve this. A number of the CMA respondents indicate that there are limits to their technical expertise in working through data collection issues but that they are prepared outsource for this expertise.

Some CMAs cite data access (including payment for data) or intellectual property issues for data residing in agency databases. If the data is readily available, is it in a suitable form to be easily used? This follows into data interpretation needs and capabilities.

Invariably CMAs wish to have ready access to information and are working through mechanisms to achieve this. At one extreme this means natural resource monitoring data, whatever is origin, being funneled or mirrored into a single data management system residing at a CMA. At another level this might mean close engagement with partner agencies to ensure timely delivery of relevant interpreted product. There is use of internet portals such as the Water Resource Data Warehouse, though the need for addition interpretative support is often mentioned. Some CMAs are closely aligned with DSE, DPI or other organizations in relation to data and data management services.
Most CMAs engage in the use of CAMS to log activity and project output. Some respondents indicate that there is more current effort in populating CAMS than optimizing its output capability. There is some anticipation that the capability of CAMS can be broadened to include natural resource indicator and monitoring data.

To advance their data management and reporting capability a number of CMAs are initiating IT strategies. This would consider coordination of internally collected information (typically coordinated at the project officer level, with data often residing in standalone spreadsheets or databases) as well as information generated from partner agencies. Another aspect of IT is spatial referencing and analysis. Some CMAs house dedicated GIS staff, though in the majority of instances GIS skills are vested in individual project officers. There is a sense that the current emphasis in GIS is more for project development and management than for reasons of technical analysis though this balance will likely change. One CMA even indicates its vision for developing ‘virtual flyovers’. Arc View is the most common GIS platform, though some CMAs use MapInfo in combination. Several CMAs assist Landcare in the use of cut down versions of GIS.

One CMA respondent mentions that it is developing a searchable research compendium that will reside on their web site.

When asked of their priorities for enhancing technical capability the following responses emerged:

- resourcing of a sustained MER capacity at the regional level (allocation of additional resources that are not just project specific)
- more attention to the reasons for and disciplines of monitoring
- development of evaluation and feedback mechanisms
- enhancement of interpretation capability especially to understand the relationship between management actions and indicator measurement (i.e. scientific testing of assumptions)
- increased IT capability for data management
- expansion of CAMS capability to incorporate mapping of natural resource indicators

8.5 Opportunities for enhancing MER capability in the Victorian regions

8.5.1 Engagement and expectations

CMA respondents recognize the complexity of establishing a sustained MER framework. The breadth, complexity and depth of inter-relationships within NRM guarantee that MER is challenging. There are few if any documented examples of fully integrated NRM MER approaches around the world, with successful examples relating to sub-elements of NRM or on localized scales.

However, like NRM itself, a MER strategy should be seen as a long term and evolving. Adaptive management equally applies. Even if just focusing on the life of 30 year resource condition targets we should be able afford some time for measured strategic thinking and iteration of ideas. Short term compliance and the need ‘to come into line’ is often seen as a hindrance, but clearly the focus should be raised to ensure achievement of longer term capability. From this review the evolution of catchment condition MER is as much about steering the development of MER approaches as it is in building technical understanding of natural resource indicators or filling information gaps.

There is a full spectrum of experiences of CMAs with regards to MER. Some CMAs are clearly driving MER within their regions, whilst others are waiting for guidance. Each region is pursuing a unique MER experience and should be engaged in this context. At the same time, government agencies involved in setting MER standards and protocols are similarly challenged. There is no perfect solution to NRM MER, and the solution that does exist resides in the range of NRM agencies across all levels of jurisdiction.

CMAs respondents offer a range of suggestions where State or Commonwealth support can assist their individual efforts in catchment condition MER, including:

- leadership
- clarity of roles and responsibilities
- engagement with regions and communities
• an appreciation of the role of regional authorities
• clarity in reasoning for indicators and MER
• development of indicator methodologies and standards
• specific resourcing for the catchment condition reporting component of MER

Most of the above can be worked through by effective engagement. This will not necessarily resolve all the issues, but bring to bear a common understanding of these in addition to the cohesive development of standards and frameworks.

Despite the complexity in MER a number of CMAs are exhibiting a level of innovation in their approach. It is important that this innovation, and level of autonomy, are stimulated rather than stifled. For instance, a ‘basic duty of MER’ might be established and agreed to enable a level of consistency and standardization, but beyond this regions could be encouraged to develop innovative approaches to monitoring, evaluation and reporting.

8.5.2 Some tangible possibilities
The CMA Workshop (Appendix 4) consolidated thought on a number of actions that could be taken to advance NRM MER in the CMA regions.

• A new forum for NRM MER was suggested. This could have two main foci:
  - for information sharing to assist regions in the mechanics of developing their MER strategies
  - to provide a collective regional Victorian voice in the engagement with State and Commonwealth Agencies on the issue of NRM MER.

This forum would be run by the CMAs with involvement from State and Australian Governments. This could be partially facilitated through the use of a web based discussion board.

• A meaningful shorter term objective could be to develop statewide catalogues of natural resource monitoring, data and knowledge products for regions in Victoria. This would assist CMAs/regions in efficiently accessing information outside their boundaries.

• Regional workshops could be organised from State and Australian Government representatives to communicate State and Commonwealth NRM MER objectives and how these relate to the CMAs, regional partners and local communities.

• The State should produce an Integrated NRM strategy that encompasses the National M&E Framework.

During the regional interviews themselves a number of other suggestions to advance NRM MER capability were offered:

• standardization of data management and GIS systems for consistency and to augment data transfer capability

• setting-up a ‘MER squad’, that, on a rolling basis, could visit regions and assist in setting up systems and standards
9. **Concluding observations**

From understanding regional perspectives there is some significant organizational context to consider when contemplating the development of regional MER capability. This presents challenges in the way institutions operate and relate to others.

**NRM MER is evolving**

- Planning and implementing an NRM MER strategy remains an immature process, with few global examples that span the geography and biophysical disciplines that a CMA region is expected to report upon. In this circumstance it is important that development of MER is seen as an evolving process, adapting to new information and new models of application. An approach of adaptive management of MER is as important as it is to NRM. A culture of MER should be integrated into the whole NRM implementation cycle. There is a broad spectrum of progress of CMAs striving to establish a formal, more outcome focussed MER capability.

**Cross-regional engagement is critical**

- The CMAs are separate independent bodies with a unique set of abilities, strengths and weaknesses. In the difficult objective of developing an effective and comprehensive MER capability it is important that there are engagement processes to allow information and perspectives to be shared between regions. The engagement between regions is probably at least as significant as those with government agencies, as it is the regions that have the task to operationalise MER.

**The need for engagement from and between the State and Commonwealth**

- The CMAs strongly believe that they have been dismissed in the development of the MFT Indicator Framework, yet they are the authorities with a legislated role to report on catchment condition. It would assist if government agencies took the time to understand the roles and responsibilities of a CMA. For a CMA to undertake its job effectively it needs to have the confidence that the State and the Commonwealth are aligned in their requirements wherever possible. Engagement with regions is important for developing a sense of ownership and commitment to what is required by government agencies.

**Innovation and leadership should be supported**

- As NRM MER is in its operational infancy, the opportunity for regions to be innovative in their MER solutions is important for its development. A number of CMA regions are already well-progressed with planning MER and are in a position of leadership on the issue, this situation ought to be used to advantage.

**The challenge of CMAs and the separation of data**

- CMAs undertake little of the monitoring that they are ultimately expected to report upon in their catchment condition reporting. There is significant reliance on partner agencies supplying the data (or information that is required). The separation in location of biophysical catchment data, the different institutional rules surrounding these (access rights, IP etc) and the varied requirements of information products make the CMA role a challenging one. Just to obtain a solid understanding of the current data and information stocks is a shared priority amongst many of the CMAs.

**Appreciating the roles of CMAs in data and information**

- There is a wide variation in views towards data management across the CMAs, this contributes to their uniqueness. However, some broader discussion of the exact role of CMAs in data and information management would be beneficial to avoid unnecessary duplication of activity. For instance, are CMAs primarily data or information collators? Are they just key participants in catchment data management or do they have a significant operational role as well? Will there then be the resources within the region to support the desired role? What about their NRM partners? This has implications for the type of data management structures and IT platforms that most effectively support a CMA region.
Need a framework for ‘aggregating’ catchment condition indicator information

- The ability to aggregate information to satisfy different jurisdictional requirements is often mentioned as an aspiration in MER, but the practical application of this needs further development. For instance, what are the assumptions and trade-offs in generalizing information? As a realistic monitoring compromise might be to restrict elements of monitoring to a region’s priority areas, how will this be reflected in aggregated and generalized products?

Additional emphasis on the contexting and interpretation of catchment indicator data

- The roles of interpreting data and applying research to understand cause and effect relationships in the landscape (e.g. the impact of a land use on a measured indicator) is possibly underestimated in the regional discussion of MER. Exploring and testing the assumptions between output and outcome is crucial to a positive embrace of the concept of adaptive management.
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- www.dse.vic.gov.au

Environment Protection Authority (EPA)
- www.epa.vic.gov.au

Murray Darling Basin Commission (MDBC)
- www.mdbc.gov.au

National Land and Water Resources Audit (NLWRA)
- www.nlwra.gov.au

Victorian Catchment Indicators On-line (VCIO)

Victorian Catchment Management Council (VCMC)
- www.vcmc.vic.gov.au

Victorian Resources On-line (VRO)

Victorian Water Resources Data Warehouse (VWRDW)
- www.vicwaterdata.net
## Appendix 1: Regional interview schedule

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<th>INTERVIEWEE</th>
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<th>DATE</th>
<th>LOCATION</th>
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Appendix 2: Interview proforma
Regional perspectives on Matters for Targets and Indicators
A review for the National Land and Water Resources Audit and DSE

These questions are primarily aimed at CMAs but will be modified to suit different audiences such as State Government staff.

Interviewer:

Date:

Interviewee information

Name (s):

Organisation:

Position:

Monitoring experience and strategies

1. What is your experience in relation to monitoring and targets?
   
   How long have you been involved in the field of Monitoring and Targets?
   
   How long have you been in your current job role?

2. Does your organization have a monitoring strategy?
   
   Does that strategy address all monitoring needs, including Matters for Targets?
   
   If not, when is it planned?
Monitoring and business needs/models

3. **What are the purposes of your organisation collecting NRM indicator information?**

   Is it more for technical or compliance reasons?

4. **In general do you believe that the monitoring information being collected meets your business need?**

   Who else in your region also needs the same or similar information?

5. **Do you receive/budget adequate levels of resourcing for monitoring in your region?**

   Who funds monitoring in the region?

   What level of human resourcing in your organization has gone into the area of monitoring over the last 12 months?

   What level of investment goes into monitoring projects that you coordinate across the region?

   Do you see that the levels of monitoring resourcing will need to increase/ decrease/ stay the same over the next 3 years to meet obligations?

   Do you think that will happen?

6. **What is the business model for your organization collecting or coordinating the collection of monitoring data?**

   a. mostly outsourced
   
   b. 75/25 outsourced/in house
   
   c. 50/50 split
   
   d. 25/75 in house/outsourced
   
   e. mostly in house
MFT and other catchment indicators
Defer to MFT spreadsheet

6. Are there Matters for Targets and associated indicators in the National M&E framework that you don't use or find difficult to implement?

   Do you have technical or practical issues with any of the MFTs/current indicators? If so, which ones and why?
   In your view, is any one indicator too costly to measure, in comparison to its usefulness? If so, please identify and elaborate?
   How closely are you following the development of the national indicators?

7. Do you use other indicators than the ones in the National M&E framework?

   What about social indicators or economic indicators?

8. Have you set RCTs for the MFT or other indicators?

   If not, which ones and why?
   Which were the most problematic?
   Do you collect other information that you use to context or check progress towards resource condition targets? e.g. qualitative information?
Data collection, storage and management

9. How would you describe data collection procedures/practices in your region and are there any particular issues that you have?

How adequate are the documented methodologies for monitoring?
Where is further methodology clarification required?
What are the key sources of technical support for your organization in implementing a monitoring regime?

10. What data storage and GIS platforms do you use and are there any particular issues that you have?

How do you store monitoring data?
What about quality, security and access of data?
What GIS and analysis/modelling capability do you have? How are these supported?
Are there particular issues that you have in relation to the analysis and reporting of indicator data?
Whom supports your organization if data management and analysis is outsourced?

11. What would be your priorities in the development of additional technical capability in the collection, management, analysis or reporting of monitoring data?

These needs may relate to research, monitoring methodologies, technology or training.
Adequacy of MFT and broader discussion

12. In your view how well does MFT/indicators meet your needs at the regional scale?

Do the indicators you use provide enough information to form an adequate picture of catchment health? If not where are the gaps? (differentiate between “Matters for Targets” indicators and other indicators).

Do you think the Matters for Targets work well together? That is, does the range of information provide additional insight over and above the individual MFTs?

Is the information considered adequate for analysis/modelling purposes?

13. What is the attitude of others both within the organization and across the region to MFTs/indicators?

Does the Board/Senior Management Team deal directly with the issue of targets? How would you characterize their use of the information?

Do others in your the organization have a different understanding of Matters for Targets than you do? Elaborate.

In your view, do the organizations that you work with at a regional scale have the same understanding of the indicators that you do? If not, is this an important issue?

In your view, do the statewide and national organizations have a different emphasis on indicators than you?

14. How well do you think that you respond to state and federal reporting requirements?

What are the inhibitors here?

Are you comfortable with these requirements?

15. Do you see what happens to the information after it is passed onto government investors?

16. Do you view how other regions or organisations are approaching the issue of monitoring?

If so, which ones.

What is the nature of the information that you are after?
17. What MER aspects would like the Australian Government and/or the state government to focus on to most effectively support your organization’s efforts?

18. Do you have any suggestions on how to leverage greater value from data collection?

   Decreasing costs - efficiency
   Increasing benefits - effectiveness

Concluding questions

19. Are there any issues in particular that you would like the review team to follow-up or gauge in greater detail?

   Are there other MER approaches that you know of that might be useful? (interstate, overseas, historical, other fields)

20. Is there someone else in the region that the review team should endeavor to talk to regarding the technical detail of indicators?

21. Do you have any questions or other issues to raise?
Appendix 3: Consolidated interview outcomes

Interviews
Some important summary characteristics of the regional interviews:

- eight CMAs were formally interviewed at CMA locations
- there was one joint interview, so seven interviews in total
- five of the interviews involved an interviewee panel of two or more
- interviews were unable to be arranged for two CMAs, though for one of these thoughts were gathered in a telephone conversation

Monitoring experience and strategies
1. What is your experience in relation to monitoring and targets?
Three CMAs have full-time dedicated MER/monitoring coordinators. These coordinators have generally been instated within the last 12 months.

One CMA reported significant collective experience in monitoring whilst at the other end of the spectrum a number are challenged by loss of expertise through high staff turnover.

A range of responses to NRM MER was received from the CMA representatives including:

- MER is an evolving process
- the breadth of monitoring and reporting yet to be understood and is lacking coordination
- previous reporting has generally been about outputs and project activities, but there is now adjustment occurring to report on outcomes
- attention to over-arching MER (as opposed to within-project MER) is restricted by a lack of resourcing
- evaluation is particularly poorly accounted for

2. Does your organization have a monitoring strategy?
Three respondents reported that their CMAs have either advanced or have completed ‘working’ MER strategies. Another mentioned that a MER document exists but that it is not effective. The remainder of the CMAs generally have plans for development of MER strategies by mid-2005.

The need for MER is usually mentioned within RCS documents with some regions having a basic ‘framework’ embedded.

The three CMAs with advanced MER development are extremely committed to it and have engaged in a degree of high level analysis of MER. Interestingly, these CMAs have teams rather than dedicated individuals overseeing MER development.

Several CMAs have held back in developing MER strategies owing to a lack of clear guidelines from the State or Commonwealth on the issue.

Monitoring and business needs/models
3. What are the purposes of you organization collecting NRM indicator information?
A range of responses was received from the CMA representatives, the most common being:

- monitoring the implementation of the RCS (or progress towards outcomes)
- to monitor resource condition
- for developing plans and setting priorities
to be able to apply adaptive management and to test assumptions (continuous learning)

- to be able to report to investors, stakeholders and communities on catchment condition

Some other interesting responses were:

- that indicators will be given more consideration given the ability to adaptive project manage
- the investor requirements of this information is not really understood
- to have evidence to refute contradictory claims

Compliance was mentioned occasionally but was never the most important reason.

4. In general do you believe that the monitoring information being collected meets your business need?

A high proportion of CMA respondents replied ‘no’ or ‘only partially’, amongst the reasons being:

- lack of baseline information or monitoring across a region
- the uncoordinated or adhoc nature of monitoring occurring across a region
- uncertainty of the nature of monitoring occurring across a region
- the difficulties in accessing data
- that data is collected by a mix of tools which are variably applied (i.e. lack of consistency)

Several regions raised the issue of having to balancing ‘whole of catchment’ monitoring versus ‘priority area’ monitoring. This is for the reason of efficient expenditure of resources. In one instance a RCS explicitly focuses on priority areas.

Other bodies mentioned to be collecting, using or interested in using similar monitoring information were reported to include:

- DPI
- DSE
- EPA
- water authorities (rural and urban)
- local government
- landholder/farming groups

5. Do you receive/budget for adequate levels of resourcing for monitoring in your region?

Resourcing is generally regarded as being inadequate to support perceived biophysical monitoring requirements. There is, however, some anticipation that the need for additional monitoring capability will be articulated within the regional MER strategies. Three of eight regions currently employ full-time MER/monitoring coordination staff.

Monitoring has traditionally has been limited to project outputs and activities rather than outcomes.

Some other notable issues raised were that:

- there is a distinction between monitoring to provide baseline condition, and then ongoing periodical monitoring of condition. The latter becomes problematic given limited life cycles of projects and an increasing reliance on ‘initiative’ funding
- A fear that enforcement of MER obligations could starve other project components including on-ground works. There is some uncertainty as to whether additional real funding for MER will be forthcoming.
- MER should be a fundamental component of all projects regardless of the nature over-arching responsibilities. A MER culture needs to be created.
- designing and implementing MER is a long term activity
- staff turnover particularly at state and national levels creates enormous inefficiencies in trying to implement MER

One CMA suggested that their monitoring budget was reasonable and that its issue was more in securing quality monitoring services.

6. What is the business model for your organization collecting or coordinating the collection of monitoring data?

The common response from respondents is that most natural resource condition data is either collected by other agencies or partners. CMAs manage or coordinate a smaller amount of monitoring that is typically sub-contracted or is undertaken in conjunction with communities (e.g. Waterwatch)

Where a CMA undertakes or coordinates catchment health monitoring funding for this activity is generally received from NAP, NHT or DSE, and is embedded in specific time-bound projects. For instance some CMAs have unique requirements in place such as platypus or bird monitoring that is used as a measure of ecological health.

Some other monitoring business models were offered:
- CMAs with specific expertise could assist with monitoring in another region
- the Monitoring Partnerships Initiative being progressively rolled out from DSE into the regions

MFT and other catchment indicators

7. Are there Matters for Targets and associated indictors in the National M&E framework that you don’t use or find difficult to implement?

Given existing RCS strategies CMAs have tended to cross-link their own indicators or targets with those of the National M&E framework. Most respondents state that this has been done reasonably effectively. It is generally felt that the nationally agreed indicators will become absorbed more explicitly with renewal of plans and the processes of adaptive management.

Several respondents indicated that they are less actively engaging in the National M&E framework owing to frustration in the delivery of standards and protocols, or the adoption of their own informed MER approaches. The same CMAs tend to question the whole MFT approach and the bureaucratic language used.

In general there is reasonable satisfaction with the theoretical list of indicators (i.e. as an aspiration), but significant difficulty is expressed with respect to their application. These difficulties revolve around technical, time and cost issues.

Roughly in order of decreasing prominence, regions had collective issues with the following MFTs and respective indicators:

**Soil condition MFT**
- significant gaps in baseline data, especially across acidity and carbon content indicators
- issue with soil carbon measurement methodologies
- soil acidity is not relevant as an indicator in NW Victoria
- is there an alternative suite of indicators that provide a better measure of soil health

**Estuarine, coastal and marine habitat MFT** (as per CMAs with coastal frontage)
- indicators and protocols are not well-developed
- there is a significant lack of baseline data

**Significant native species/ecological communities MFT**
- indicator protocols are not finalised
should these be determined based on regional boundaries?
limited resources means that emphasis should be on habitat rather than individual species

**Wetland condition indicators**
- no agreement on indicator protocols yet
- complexity in condition measurement of ephemeral wetlands (especially NW Victoria)
- how are semi-permanent saline wetlands treated?

Issues raised with individual indicators are listed in Table 3.

Some other notable issues raised with respect to MFT:
- not all MFTs are of equal relevance
- the distribution of measured indicators may be sufficient to describe regional circumstances, but are insufficient to describe a region’s priority areas
- progress towards resource condition targets is not necessarily linear and reporting requirements need to respect this

8. **Do you use other indicators than the ones in the National M&E framework?**

Some other natural resource indicators suggested or currently implemented:
- one respondent mentions that it uses climate as an indicator
- one region speaks of implementing an air quality indicator
- one region mentions urban-related indicators (such as litter)
- one region is surveying birds and platypus as surrogates for indicating biodiversity health

Several CMAs are monitoring social engagement activities (especially LandCare).
Several CMAs mention that they are not primarily responsible for delivering social and economic outcomes, though they wish to understand community issues and the socio-economic impacts of and effects on their biophysical condition targets. One CMA sees monitoring of social and economic trends as being critical to its task due to the location of significant environmental assets on private land. Others do not see socio-economics as part of their core business. There is varied level of progression towards defining socio-economic indicators, with some criticism on the lack of guidance in developing these.

9. **Have you set RCTs for the MFTs or other indicators?**

Respondents generally report that they have set RCTs for most of their catchment indicators. Some of these are regarded as interim until more (or quality) data is received or there is greater technical understanding of the indicator. Some respondents admit that a number of their RCTs are obscure, almost aspirational in nature. There are some strong concerns in the assumptions used in developing targets and the ability to measure them.

**Data collection, storage and management**

10. **How would you describe data collection procedures/practices in your region and are there any particular issues that you have?**

Many CMAs rely on external providers to undertake monitoring on their behalf with varied levels of interaction with sub-contracted organizations.

A common response is that data collection is not only fragmented, but poorly catalogued and understood. This is in the context that CMAs are only directly responsible for a minor proportion of this monitoring, with most it being performed through other agencies.

There were varied responses about methodology documentation, but common recognition that some of the indicator protocols have not been sufficiently developed.
Respondents typically recognise that there is a broad range of expertise within other agencies with respect to their monitoring roles that ought not be duplicating within their own agency.

11. What data storage and GIS platforms do you use and are there any particular issues that you have?

Respondents typically report that where their respective CMAs undertake monitoring this is usually coordinated at the project officer level, with data often residing in Excel spreadsheets or Access databases. These data management systems tend not to be coordinated in a broader data management strategy.

Several regions cite issues with reliable data access (including payment for data) and IP issues for data residing in agency databases.

There are wide ranging capabilities and aspirations for data management with the CMAs. Some are quite clear about their becoming ‘central data banks’ for their region. Others are prepared to persist and improve existing channels for data access from partner agencies or internet portals. Some CMAs are closely aligned with DSE, DPI or other organizations in relation to data and data management services.

Widespread use of CAMS is reported with a general recognition that CAMS is about logging activities and outputs. Some respondents state that significant effort is being expended in inputting data rather than the opportunity to maximize the use of outputs from the system. Some hope is expressed that CAMS can be broadened to include indicator data.

There is confidence in a number of CMAs that AXAPTA will facilitate financial and project reporting.

Some CMAs house dedicated GIS staff, though in the majority of instances GIS skills are vested in individual project officers. One respondent explicitly noted that GIS is used more used for project development and management than for technical or analysis reasons. By contrast another CMA is sensing the opportunity to develop ‘virtual flyovers’. Spatial data layer sourcing is mentioned as an issue.

Arc View is the most common platform, though some regions use MapInfo. Several regions assist LandCare in the use of cut down versions of GIS e.g. Streets Ahead.

Several CMAs looking at developing an IT strategy to cope with current and future data requirements.

One region mentioned that it is developing a searchable research compendium that will reside on their web site.

12. What would be your priorities in the development of additional technical capability in the collection, management, analysis or reporting of monitoring data?

The following priorities were amongst those more commonly expressed by the CMA respondents:

- resourcing of a sustained MER capacity at the regional level (allocation of additional resources that are not just project specific)
- more attention to the reasons for and disciplines of monitoring
- development of evaluation and feedback mechanisms
- enhancement of interpretation capability especially to understand the relationship between management actions and indicator measurement (i.e. scientific testing of assumptions)
- increased IT capability for data management
- expansion of CAMS capability to incorporate mapping of natural resource indicators

Adequacy of MFT and broader discussion

13. In your view how well does MFT/indicators meet your needs at the regional scale?

The general response is that the framework is or appears ‘reasonable’, though there are some difficulties with its practical application (see Q7). A number or respondents mention uncertainty in understanding or
the language used in the MFT and indicator framework, though there is some recognition that it is only early in its application.

Some specific responses are that:

- the concept has not yet been adequately tested
- the concept has not been well communicated (what is its rationale?)
- that there is more confidence in referring to an understood and agreed regional approach that an uncertain national one
- that there is uncertainty as to how it relates to state requirements
- that it misses on social indicators

14. What is the attitude of others both within the organization and across the region to MFTs/indicators?

Most respondents generally believe that their CMA boards and senior management are strongly supportive of catchment indicators as a measure of outcome. However many of the boards are conversant with MFT per se, being more used to language of RCTs.

Though not always the case, project and implementation staff can be more preoccupied with project outputs than MFT outcomes.

Communication with partners on resource condition tends not to be based on MFTs, but more so in the language of RCTs.

Some specific responses received:

- ‘just another box to tick’
- It is difficult to use MFT in project proposals
- It provides a focus for monitoring
- regulatory state obligations are more important

15. How well do you think that you respond to state and federal reporting requirements?

Respondents generally believe that their agencies report well on what they are asked, but it tends to be out of obligation rather than any real sense of value or effectiveness.

Amongst the more common responses are that:

- there is significant uncertainty in indicator reporting requirements for commonwealth and state (there are no agreed procedures in place).
- reporting is still more about outputs than progress towards outcomes, for instance RMP reporting and a focus on MATs
- there should be dialogue between jurisdictions to develop a mutually agreed relevant reporting approach.

Some more notable specific responses received:

- that there is a stick rather than carrot approach to reporting
- that there is no process to allow community ownership of state and federal reporting obligations
- it is better to go for fewer strategic indicators than the ‘more is better’ approach

16. Do you see what happens to the information after it is passed onto government investors?

Almost universally the answer is ‘no’, unless the information is proactively sought or there is a particular relationship with the investor.
Some notable specific responses received were that:

- there is a need to understand the carriage of the information that is provided
- sometimes regions need to buy information back, or that there are IP issues surrounding it
- is the feedback meaningful anyway?
- slow response to requests for information from investors
- VCIO is a tool that is no longer supported

17. Do you view how other regions or organizations are approaching the issue of monitoring?

Observing the approaches of other CMAs is common, with a number of references to:

- Mallee CMA (has a traditional strength in monitoring)
- Goulburn Broken CMA (has a current MER strategy)
- East and West Gippsland (the MERGe approach)

Some other approaches or organizations mentioned include:

- the ‘Canadian model’
- the Moreton Bay Healthy Waterways Report Card

18. What MER aspects would like the Australian Government and/or the state government to focus on to most effectively support your organization’s efforts?

Respondents report a comprehensive list of suggestions, the most popular being:

- leadership in MER
- clarity of roles and responsibilities
- engagement with regions and communities in MER
- an appreciation of the role of regional authorities
- clarity in reasoning for indicators and MER
- development of indicator methodologies and standards
- specific resourcing of MER activity

A number of other suggestions are mentioned, including:

- due recognition of regional effort and regional differences
- streamlined and consistent reporting standards (a minimum standard?)
- frameworks would be better established before strategy and plan development proceeds
- the development of socio-economic indicators
- a prioritised scale of information requirements

19. Do you have any suggestions on how to leverage greater value from data collection?

A very common response is that there is a need to understand what/where/how/why of regional data collection first.

Some interesting specific responses are that:

- maybe the regions should get together independent of state (or commonwealth)
- targeted data collection in priority areas or to meet exact investor requirements
• consistency and adoption of standards
• adoption of ‘monitoring partnerships’
• use program logic to develop monitoring strategies
• providing a broader based information resource
• do not allow to monitoring to fall below critical thresholds

Concluding questions

20. Are there any issues in particular that you would like the review team to follow-up or gauge in greater detail?

The common responses can be summarized as:

• encourage more leadership, engagement and collaboration from state and federal authorities
• encourage clarity in the indicators and why we are measuring them

Another suggestion is that there is a need to discuss data interpretation methods and coordination.

One specific response received is that the state ought consider setting-up a ‘MER squad’, that, on a rotational basis, could visit regions and assist in setting up systems and standards.

One respondent suggests it would be a good idea to speak to some community based representatives in this discussion.

Other MER approaches that might be usefully follow-up include:

• the need for rapid assessment capability in MER (that is otherwise complex)
• CSU Murrumbidgee monitoring
• Bulletin 6 Environmental Indicators for Metropolitan Melbourne AIUS Oct 2003
• Riverland Irrigation Feedback Project
• TBL reporting, LWA

21. Is there someone else in the region that the review team should endeavor to talk to regarding the technical detail of indicators

Respondents offered a range of contacts within their respective agencies.

22. Do you have and questions or other issues to raise?

A number of issues are raised by the CMA respondents including:

• whether the state could lead the development of a database containing regional research and monitoring documents that could be accessed by anyone interested
• Will CAMS be developed to support resource condition information?
• Where does SOE fit?
• How will the information collected here be used by NLWRA and DSE?
• The state Waterways forum has worked well, why cannot the same happen with Land and Biodiversity?
• To be practically addressed MER should be disaggregated into its components
• What is the context of the multi-regional MER proposal with respect to this project?

One respondent strongly argues that MER is a long term investment so that we need to be patient on its returns.
Appendix 4: CMA Workshop

The workshop
A workshop was held on Friday 5 November 2004 for CMA representatives involved in the regional MFT/MER interviews. The primary aims of the workshop were to:

- discuss the draft Regional MFT/MER report
- look at opportunities for assisting the Victorian CMAs in advancing their NRM MER capability

Seven of the ten CMAs were represented at the workshop. Also in attendance were representatives from DSE, the Victorian NAP Office, and the National Land and Water Resources Audit.

Les Rowell opened with an introduction and outlined DSE’s concept of the project. David Heislers (EWR) then presented the findings in the draft Victorian regional report. Rob Thorman and Peter Wilson from the NLWRA followed with their consolidated findings from the MER trials that have been conducted in the other states. They also gave a general overview of the NLWRA and the plans for the subsequent stages of the audit’s program on developing, applying and reporting on natural resource condition indicators.

Two short facilitated sessions were devoted to:

- clarifying and adding to the key messages in the Victorian report
- highlighting the opportunities to advancing regional MER capability

The outcomes of these sessions were as follows:

Key messages to be conveyed in the Victorian report

- NRM MER is evolving
- Regional differences should be recognised and CMA innovation and leadership needs to be supported.
- Elements of MER that are commonly required or useful across CMAs should be identified and become a shared resource where this is practical.
- There is often a lack of integration between the State Governments and the initiatives.
- Poor communication between and within organisations is a barrier to information dispersal.
- CMAs need to play a central role in participatory decision making for monitoring, coordinating natural resource knowledge capture, and facilitating pathways for accessing the underlying data.
- CMAs need to become more rigorous and frugal about the data they deem relevant to their catchment health reporting roles and related decision making processes.
- Further definition is required to clarify the roles and expectations of all partners and providers in data access, storage, capture and management.
- There is a need for processes to aggregate indicator information and to describe the assumptions in undertaking this.
- A greater emphasis is required on data interpretation to understand cause and effect relationships (for instance the relationships between management action and indicator response).
- MER needs to be integrated into the whole NRM implementation cycle.
Opportunities for advancing NRM MER in the Victorian regions

- A new forum for NRM MER was suggested. This could have two main foci:
  - for information sharing to assist regions in the mechanics of developing their MER strategies
  - to provide a collective regional Victorian voice in the engagement with State and Commonwealth Agencies on the issue of NRM MER

This forum would be run by the CMAs with involvement from State and Australian Governments. This could be partially facilitated through the use of a web based discussion board.

- A meaningful shorter term objective could be to develop statewide catalogues of natural resource monitoring, data and knowledge products for regions in Victoria. This would assist CMAs/regions in efficiently accessing information outside their boundaries.

- Regional workshops could be organised from State and Australian Government representatives to communicate State and Commonwealth NRM MER objectives and how these relate to the CMAs, regional partners and local communities.

- The State should produce an Integrated NRM strategy that encompasses the National M&E Framework.
Appendix 5: Project contact database

Note: this list comprises primary contacts, but not necessarily all contacts in the organizations listed. It is envisaged that the primary contracts would refer to others as required/requested. For this reason individuals such as CMA Program Managers, though often involved in the regional interviews, are not listed.

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<th>NAME</th>
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<td>Consultant to DSE</td>
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<tr>
<td>Shawn Butters</td>
<td>EWR</td>
<td>NRM consultant/facilitator</td>
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<td>0429 412 670</td>
<td><a href="mailto:shawnbutters@ewr.net.au">shawnbutters@ewr.net.au</a></td>
<td>Consultant to DSE</td>
</tr>
</tbody>
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Appendix 6: Key reports and information sources

Regional reports

Glenelg Hopkins CMA
Setting Resource Condition Targets and Sustainability Indicators (Draft 2003). SKM & Regional Innovation for the GHCMA

Goulburn Broken CMA

Gippsland MERGe
Natural resources report card, background paper (October 2004). GINRF

Mallee CMA
Biodiversity catchment condition report for the Mallee Region (2004). Draft report. MCMA.
Interim report on the condition of waterways, wetlands and floodplains in the Mallee Region (2004). MCMA.
Land resources catchment condition report for the Mallee Region (2004). MCMA.
Water resources catchment condition report for the Mallee Region (2003). MCMA.

State reports

Victorian NAP Office

Victorian Catchment Management Council (VCMC)
Know your catchments (1997). VCMC.
National reports

NLWRA

Assessment of data requirements and availability to address natural resource condition and trend indicators (September 2004). Parts A, B and C.

National Natural Resource Management Monitoring and Evaluation Framework (Draft April 2003). Refer to NLWRA.

National Framework for Natural Resource Management Standards and Targets (Draft April 2003). Refer to NLWRA.

MDBC


Useful MER related websites

Victorian

Department of Sustainability and Environment

www.dse.vic.gov.au

Environmental Protection Agency

www.epa.vic.gov.au

Gippsland Integrated Natural Resources Forum

www.ginrf.org.au

Victorian Catchment Indicators Online (VCIO)


Victorian Catchment Management Council

www.vcmc.vic.gov.au

Victorian Resources Online (VRO)


Victorian water resources data warehouse

www.vicwaterdata.net

National

National Land and Water Resources Audit

www.nlwra.gov.au

Australian government NRM (inc. NAP, NHT)

www.nrm.gov.au

Includes downloadable documents on national MER frameworks, MFTs and indicators

CSIRO guide to environmental indicators


Regional (other than CMA)

Moreton Bay Waterways and Catchments Partnership

www.healthywaterways.org

Report cards of waterway eco-system health in SE Queensland