



Background

The Murray–Darling Basin is recovering from the Millennium Drought which gripped southern Australia from 1997 to 2009. Rivers suffered greatly with inflows in the twelve-year period of the drought 40 per cent below the long-term average. The severe conditions had profound effects on agricultural and horticultural industries, regional communities and river ecosystems.

Whilst near average rainfall returned to the Murray–Darling Basin in 2009–2010, inflows remained low due to the preceding dry conditions. It was not until October 2010 that the mouth of the River Murray experienced its first natural flow since 2002. In late 2010 and early 2011, record breaking rains replenished the Basin’s rivers and wetlands.

Understanding ecosystem health through condition and trends in the Murray–Darling Basin is critical to restoring the health of the river systems. The SRA report 2 assesses 23 designated valleys of the Basin. It reports on the ecosystem health and condition of the Murray–Darling Basin’s rivers at the end of the Millennium Drought, from 2008 to 2010. The report should therefore be interpreted in the context of the SRA sampling regime and the final years of that drought.

SRA report 2 assesses the condition and ecosystem health of the Basin’s river ecosystem by combining spatially aggregated information collected at randomly distributed sites with mapping and modelling data. The condition assessments for each valley are related to a benchmark called reference condition. Reference condition estimates the health status of a component as it would be in the absence of significant human intervention in the landscape. It is not used as a target for management but is a benchmark representing the river ecosystem in a definitive state of good health.

Ecosystem Health of the valleys or catchments of the Basin

Overall, the results show that the health of the valleys ranged from good to very poor.

Most valleys rated as poor (see Table 1). Of the 23 valleys assessed, only the Paroo was rated as being in good ecosystem health. The Warrego valley was the only valley rated in moderate ecosystem health. Fifteen other valleys were rated in poor ecosystem health and six were rated in very poor ecosystem health. The Castlereagh, Condamine and Darling valleys were rated in poor ecosystem health, falling just below the lower bound for a moderate ecosystem health rating. No valley in the Basin was rated in extremely poor ecosystem health.

In the north of the Murray–Darling Basin, only one of the nine valleys was rated as being in very poor river ecosystem health (the Macquarie), compared to five of the 14 southern Basin valleys (Table 1).

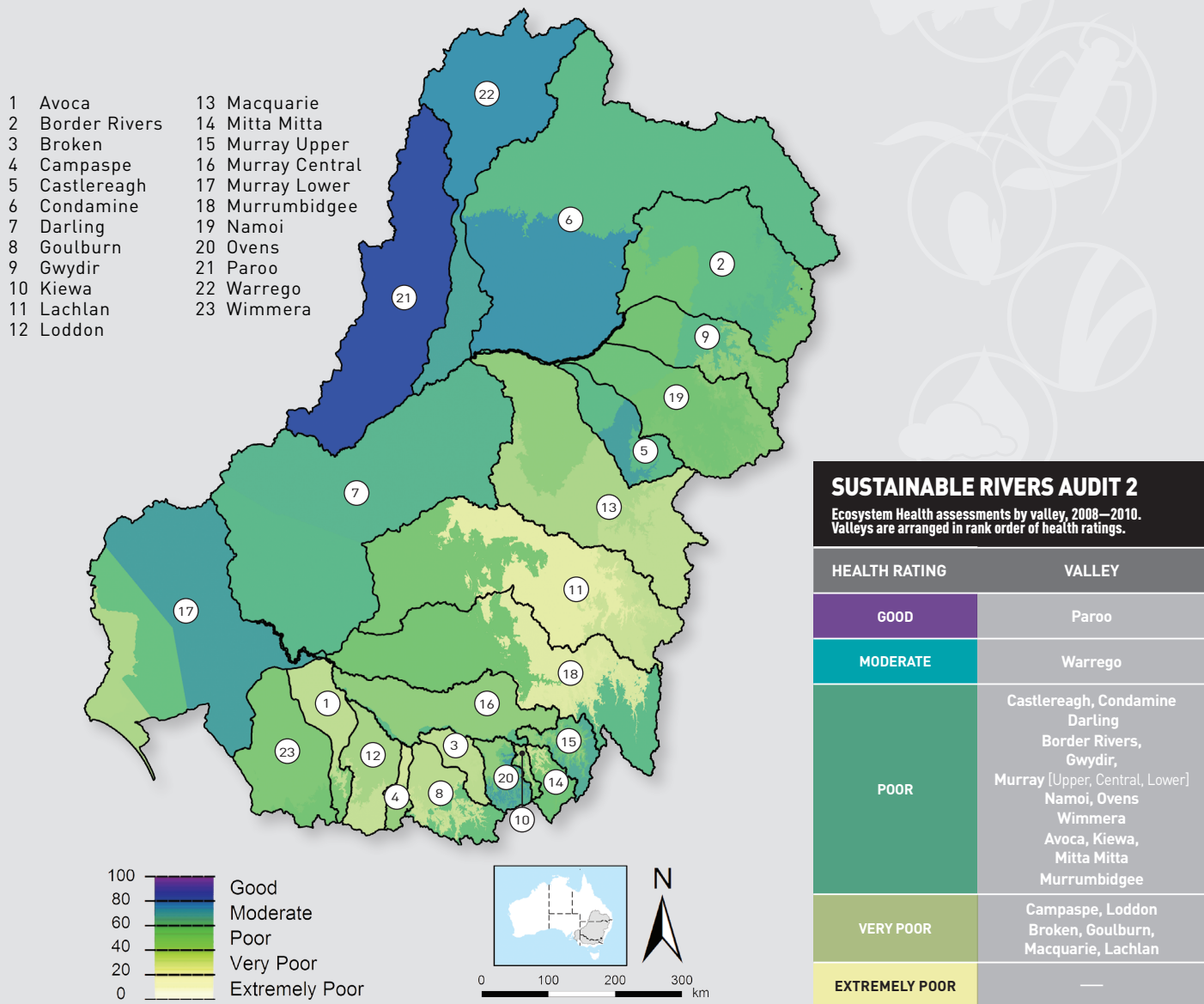
Ecosystem Health of different parts of the valleys

The SRA divides the 23 designated river valleys into 68 altitudinal zones.

Figure 1 provides a map of the ecosystem health scores by zone throughout the Murray–Darling Basin. It illustrates some of the zonal variability which forms the aggregated valley scores. A fuller description and maps of both zone and valley ecosystem health scores is provided in the SRA 2 snapshot brochure and summary report.

The Paroo Lowland, which makes up the entire Paroo valley, was the only zone rated in good ecosystem health. Most zones were rated as being in poor (39 zones or 57%) or very poor ecosystem health (20 zones or 29%). Both zones of the Warrego valley were rated in moderate ecosystem health. The lowland zones of the Condamine, along with the upper zones of the Darling and Lower Murray were also rated in moderate ecosystem health, as were the Slopes zone of the Castlereagh; the Upland zone of the Ovens and the Montane zone of the Upper Murray.

All except one of the 20 zones rated as being in very poor health were in the southern Murray–Darling Basin.



Changes to the SRA method over time

The SRA report 2 represents a major refinement and improvement of the methodology used to assess the status of the Basin’s river ecosystem health. SRA analysis methods were modified with new measurements and improved metrics. In addition, SRA report 2 includes two new themes: vegetation and physical form. The refined methods in SRA 2 resulted in more accurate representation of condition of the ecological components (themes) and overall ecosystem health. Due to the changes in methodology, it is not possible to directly compare the results from SRA 1 and SRA 2. SRA 2 does, however, include an analysis of changes over time for individual themes including fish, macroinvertebrates and hydrology using the data collected over the entire SRA program (2004–2010).

The difference in methods influences the relative ecosystem health ranking of the 23 valleys. Despite this, the relative rankings appear very similar between both assessments. This is because findings

for two of the three themes (fish, macroinvertebrates) are similar and these carry considerable influence on the ecosystem health rating.

Within themes, method refinements have also resulted in some changes. For example, the fish theme now measures recruitment, an indicator which had not been developed for the SRA 1. This additional information provides a more comprehensive picture of the fish condition in the Basin.

In SRA report 2 the condition of riverine vegetation has been identified as a contributing measure of river ecosystem health. Ecosystem health is based on integrating condition scores from the fish, macroinvertebrates and riverine vegetation themes using a set of expert rules. In contrast, the ecosystem health rating in SRA report 1 was derived by combining condition ratings for fish, macroinvertebrates and hydrology.

Due to these changes in themes, methods and integration direct comparison of SRA 1 and SRA 2 is not recommended.

Condition and temporal patterns within themes

Key findings from the first analysis of temporal patterns against reference condition show that:

- The condition of fish communities improved significantly in seven valleys and declined significantly in seven valleys from 2004 to 2010 (five in the southern Basin and two in the northern Basin); the remaining nine valleys showed no significant change.
- There was no consistent pattern evident of either rise or fall in macroinvertebrate condition across all valleys from 2004 to 2010.
- For hydrology, trends in flow alteration (from 1998 to 2009) included a general decline in catchment runoff over this period, and an increase in flow alteration relative to reference condition in low flows, high flows and flow seasonality.

A robust trend analysis will require more information through time, which will allow an assessment of natural variability to be taken into account.

How does SRA report 2 differ from other river health assessments?

There are various river health assessments undertaken by different levels of government or NRM agencies with different objectives, methods and questions they are trying to answer. The Framework for Assessment of River and Wetland Health (FARWH) has developed a number of principles to address potential differences and to provide the ability to compare and integrate different types of assessment—conducted at state, territory and basin scale.

Recently, a number of assessments have been published or are being finalised for publication by a selection of agencies. These assessments, and the main differences with SRA 2, are listed in Table 2.

How does SRA report 2 relate to the proposed Basin Plan?

A key aim of the proposed Basin Plan is to improve the health of the Basin by setting a long-term **environmentally sustainable level of take** (ESLT) of water from its rivers. This is the amount of water that can be used (on average) for consumptive use (irrigation, agriculture, drinking etc). The plan also aims to meet environmental needs through water quality and salinity management and improved quantities and management of environmental water.

The Basin Plan will not address catchment influences such as:

- vegetation clearance and impacts associated with productive land use
- over-exploitation of native species
- the influence of invasive species
- habitat alteration.

These influences have also contributed to the observed decline in health of the Basin’s rivers, wetlands and floodplains. As such, the Basin Plan is not a standalone plan to address river health; and many other complementary river and catchment management activities will still be required.

The focus of the Basin Plan is on rebalancing the call on Basin resources from consumptive uses to a more sustainable level, thereby reducing the stresses on the Basin’s Rivers. The ESLT as established by the MDBA is underpinned by detailed assessments and hydrological modelling of flow requirements of key environmental assets and key ecosystem functions across the Basin.

The hydrology condition index of the SRA report 2 assessments is somewhat related to the hydrology assessment for the proposed Basin Plan, as this index represents a broad assessment of water stress. Flow requirements for ecological assets operate on different spatial scales and may not always align with condition scores at the valley or zone scale. In SRA report 2, the integrated ecosystem health rating does not incorporate the assessment of hydrological condition because hydrology is considered one of the major drivers of ecosystem health, but time lags may play a role. Accordingly, despite a number of river valleys being assessed as being in good hydrological condition in SRA report 2, their overall ecosystem health rated as poor—this applied to the Avoca, Border Rivers, Broken, Castlereagh, Kiewa, Mitta Mitta, Namoi and Ovens River valleys.

