Geoscience Australia's Submission to the Senate Select Committee on the *Multi-Jurisdictional Management and Execution of the Murray-Darling Basin Plan*

Introduction

Geoscience Australia is pleased to make this submission to the Senate Select Committee on the *Multi-Jurisdictional Management and Execution of the Murray Darling Basin Plan*.

Geoscience Australia is Australia's national geoscience public sector organisation. We are the nation's trusted source of information on Australia's geology and geography for decisions by government, industry and communities. Geoscience Australia's work covers the Australian landmass, marine jurisdiction and territories in Antarctica and our expertise and geoscientific data covers a range of geoscience disciplines, including minerals, energy and groundwater resources and positioning, mapping, geohazards and earth monitoring.

Geoscience Australia provides science-based analysis, data and advice on Australia's water resources. In relation to the Murray-Darling Basin, Geoscience Australia provides information on the location of surface water to the Authority.

Geoscience Australia partners with, and provides foundational data to, governments in Australia to enable them to better manage Australia's water. 'Securing Australia's water resources' and 'Enabling an informed Australia' are two of the six strategic priorities that Geoscience Australia has set in its ten-year plan, *Strategy 2028,* and can be accessed at www.ga.gov.au/strategy-2028. It is across these two priority areas that Geoscience Australia has focussed our submission.

In preparing this submission, Geoscience Australia has reviewed the Terms of Reference for the Inquiry and the supporting Issues Paper, which considered a range of matters including water recovery and environmental water, compliance and adequacy of information.

There are clear efficiencies to be gained in the management, execution and monitoring of the Murray-Darling Basin Plan (Terms of Reference 1) through consistent, cross-basin geoscientific information. These benefits relate to both water managers and water users.

A nationally consistent approach to the collection of geoscientific information would support both greater transparency across jurisdictions and better cross-jurisdiction collaboration. One example of this is the proposed *Northern Basin Hydrometric Network and Remote Sensing Project*, which is currently being scoped by the Murray-Darling Basin Authority, New South Wales and Queensland state governments, in partnership with Geoscience Australia and the Bureau of Meteorology. The Project is targeting the establishment of a multi-jurisdictional common scientific understanding of the Basin, ultimately supporting transparent and consistent management and decision-making across the Basin.

Finally, consistent with this view, Geoscience Australia would support further facilitation of collaborative, multi-jurisdictional projects beyond that mentioned above, that contribute to a consistent approach to the management and monitoring of the Basin's water resources. Such projects should be underpinned by a stable and transparent science base.

Issues Paper: *Multi-Jurisdictional Management and Execution of the Murray Darling Basin Plan*

Adequacy of information

The Issues paper identifies the *"need for a single source of information on the Basin to assist transparency, compliance and monitoring efforts".* The four intergovernmental agreements in the Murray-Darling Basin rely on clear and consistent information across state boundaries to support continuity of water resource management across state boundaries.

- Consistent and transparent geoscientific information is critical to supporting these agreements and would provide a transparent platform upon which governance decisions are made.

Geoscience Australia is of the view that the Murray- Darling Basin should be considered as part of water resources systems across the broader Australian continent. An example is the vertical interactions between the Condamine, Balonne, Moonie and Border Rivers groundwater resources in the Basin with the underlying Great Artesian Basin. Decision-making for the Basin would be made more robust with improved understanding of the lateral and vertical connectivity of geological basins and their associated groundwater systems, which extend across jurisdictional borders.

In addition to information from Geoscience Australia's foundation datasets, there is potential for the application of novel technologies to contribute to the evidence base for decisions and governance.

These datasets and technologies include accurate mapping, geographic and geological, location and elevation data, land surface deformation and satellite remote sensing. There is a range of underpinning foundation datasets that can help decision-makers better understand the location and context of the Basin's hydrological features and other Basin data. These foundation datasets include:

- Administration boundaries
- Elevation
- Transport features
- Land use
- Land cover
- Land tenure

Much of this information is aggregated nationally, through coordination by Geoscience Australia, under the *Foundation Spatial Data Framework.* The Foundation Spatial Data Framework (FSDF) provides a common reference for the assembly and maintenance of Australian and New Zealand foundation level spatial data in order to serve the widest possible variety of users. Geoscience Australia is the national custodian of a number of the foundation spatial datasets in the Framework. Applications of the datasets range from evaluating baseline environments, to monitoring and analysis for management, and for supporting evidence-based compliance. For example, there is potential for government and industry to prioritise the systematic capture of better resolution elevation data over the Basin.

Monitoring and evaluating Basin Plan implementation

The Issues paper invites submissions that *"suggest ways that monitoring and evaluation of the Basin Plan's implementation might be strengthened further still."* In 2018, the Murray-Darling Basin Authority, supported by Geoscience Australia, successfully trialled satellite imagery for water compliance during an embargoed flow event. Following the trial the Authority publically stated:

> *"Satellite technology has helped us have a detailed look over a large area, giving us a valuable new tool to ensure water is delivered to where it is needed and is not diverted for unauthorised use. We now know the technology works, in concert with other lines of evidence. We'll now look at how to use it wholesale to strengthen monitoring and compliance across the Basin"* (MDBA, Media Release, 12 September 2018)

As a result of this success, Geoscience Australia and the Murray-Darling Basin Authority have continued to collaborate on using satellite imagery to support compliance and monitoring activities. Noting that collaboration across the Basin is critical to the monitoring and evaluation requirements of the Plan, activities are underway to increase the scale of this work and make it available to all parties tasked with the management of the Basin.

Work is currently being scoped for the *Northern Basin Hydrometric Network and Remote Sensing Project.* The Project will be a collaboration between the Murray-Darling Basin Authority, New South Wales and Queensland state governments, in partnership with Geoscience Australia and the Bureau of Meteorology. The aim of the project is to establish a centralised means of providing information for the Basin by using common scientific and compliance baselines.

Water recovery

Geoscience Australia notes the Issues Paper highlights that *"there is no way to tell with sufficient confidence exactly how much water is available across the Basin at any one time due to deficiencies in water accounting systems and water tracking technology."*

Given the large scale of the Basin establishing a single operating picture of the whole Basin at any point in time is difficult. Currently, surface water is monitored through stream gauges and meters in specific locations across the Basin and groundwater is monitored through a series of dedicated monitoring bores. However, the sparsity of these on-ground monitoring points relative to the size of the area means that information collected at a particular location can only be representative of a much larger area.

Geoscience Australia's Digital Earth Australia Program (DEA) has successfully collaborated with the Murray-Darling Basin Authority and NSW Department of Planning, Industry and Energy to use satellite information to supplement on-ground measurements of surface water across the Basin. The *DEA Waterbodies* product maps the location and extent of waterbodies across Australia, and then tracks changes in the wet surface area within each waterbody over time. However, the DEA Waterbodies does not show the depth, volume or purpose of the waterbody, nor the source of the water.

Nonetheless, the DEA Waterbodies product provides insights into the location of water throughout the Basin at any given time, and how it changes over time. Such remote-sensing products can be evolved using a combination of other data held by Geoscience Australia. For

example the DEA Waterbodies product, when analysed with elevation, monitoring and mapping information, could provide basin-wide estimates of available surface water, which could be updated on a weekly basis. These estimates could subsequently be refined as advances in satellite technology yield higher spatial resolution data.

Environmental water

The Issues Paper highlights that *"environmental water delivery is not as precise as needed and there is a lack of transparency in how environmental outcomes are measured."*

The spatial footprint of environmental water is inherently uncertain, given the very large area over which it can travel between leaving an upstream storage and the intended target downstream, and the interaction between surface water, soil water, groundwater, vegetation and the atmosphere. Geoscience Australia's DEA program is collaborating with the Commonwealth Environmental Water Office and the Environmental Water Governance team at NSW Department of Planning, Industry and Energy to provide insights into the outcomes delivered by environmental water. Satellite imagery is being used to monitor the inundation footprint of environmental watering events, providing insights as to whether watering targets are being reached.

In addition, Geoscience Australia's archive of more than 30 years of satellite data, when combined with stream gauge data, provides insights to the relationships between river heights as measured at a gauge, and the inundation footprint observed both locally and remotely. This insight allows environmental watering events to more accurately target assets, by providing an objective indicator of the likely floodplain footprint of a particular river height. This could be applied across the Basin to support outcome measurement and transparency.

Conclusion

As is evident from the examples highlighted, Geoscience Australia's expertise can provide support to, and inform, the multi-jurisdictional management of the Murray-Darling Basin. Geoscience Australia's up-to-date satellite imagery, together with a sound understanding and provision of nationally consistent hydrogeology and geography data, would support consistent decision making and cross-basin collaboration by water managers.