



# Is there public desire for a federal takeover of water resource management in Australia?

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## ABSTRACT

Multi-jurisdictional water governance issues remain an ongoing challenge in transboundary and other water resource areas. Achieving coordinated and effective governance at the local, state, federal and international levels remains critical for good water governance. Under Australia's 1901 Constitution, states have the power to allocate water resources. To date, water resources in numerous areas have been overallocated to consumptive use, causing increasing environmental sustainability challenges. This is particularly prevalent in Australia's Murray-Darling Basin (MDB), which spans four states and one territory, posing significant governance challenges. Due to the difficulties of changing and coordinating water management across multiple states, a growing number of Australians are calling for a complete Federal takeover of water resources through constitutional amendment. To change the Constitution, a double majority vote would be required, namely from both the Australian public nationally and from a majority of voters in a majority of the states. This study investigates the Australian public's desire for a Commonwealth takeover of water resources, focussing specifically on the MDB. It finds only lukewarm support for a Commonwealth takeover of water resources, with less than four in ten participants supporting the proposal. Overall, the ACT and South Australia are the only areas with a slight majority in favour of the takeover. One of the strongest predictors of support was location (such as living in a MDB state, and especially South Australia), but other significant factors included age, education, children, home ownership and trust in the Federal government and university researchers. We conclude that a complete water resource takeover by Federal government is highly unlikely to occur, but offer insights into other areas where increasing Federal intervention is warranted.

## 1. Introduction

A growing body of literature is examining water governance issues around the world, as climate change increases the challenges associated with water scarcity, quality and flooding (e.g. Daniell and Barrateau, 2014; Daniell et al., 2014; Holley and Sinclair, 2018; Grafton and Williams, 2019; Wheeler, 2021). Effective governance is extremely difficult to achieve given the transboundary nature of water resources, and the multitude of institutions and affected parties (Garrick and De Stefano, 2016; Wheeler, 2023). Australia provides an example of one of the driest inhabited continents on the earth that is struggling with over-allocation issues and increasing variability issues, as well as how to effectively govern such challenges (Baldwin and Ross, 2012; Wheeler, 2014). The Murray-Darling Basin in Australia (MDB) is an example of a transboundary river basin contained within one country, where jurisdiction is

shared across several political boundaries. Other examples of major river basins within countries include the Mackenzie River Basin in Canada (Morris and De Loë, 2016; Armitage et al., 2015); the Mississippi River Basin in the United States; and the Yangtze River Basin in China (Li and Jin, 2023). This form of transboundary water governance can pose coordination challenges and conflicts similar to those associated with governing international freshwater systems, and effective governance requires both horizontal (interstate) and vertical (state-federal) policy integration (Garrick and de Stefano, 2016; Morris and De Loë, 2016).

Spatial and temporal water scarcity in Australia – particularly across the largest irrigated agricultural region, the Murray-Darling Basin (MDB) – means that water has featured as a battleground between states since European settlement began in 1788 (Connell, 2007; Wheeler, 2014). Prior to Federation in 1901, there were six self-governing

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colonies that adopted English riparian doctrine and common laws. The colonies then became the six states of the Commonwealth of Australia together with a Federal government, and the same state systems continued. Consequently, the MDB, a transboundary river system that covers over a million square kilometres, is now described as 'not so much a national system', but as 'the rivers of four states and one territory' (Australian Senate Select Committee (ASSC), 2021: para 2.8). Governed by a Federal constitutional structure comprised of six governments,<sup>1</sup> water regulation in the MDB takes place within a dense and complex framework of legislation, regulations, policies, and intergovernmental agreements (Webster, 2019). This complexity has been exploited by vested interests that are active at all levels of the political system (Connell, 2013; ASSC, 2021).

The MDB's environmental health has significantly deteriorated under this governance system. Over-extraction under drought conditions has contributed, for example, to mass fish kills in the Menindee Lakes and Lower Darling River in 2018 and 2019 (AAS, 2019), and has also been associated with recent 2023 fish kills in the same area (Kingsford, 2023). Communities, stakeholders and scientists continue to disagree about what constitutes sustainable extraction levels in the context of competing water uses. As a result, the question of whether water should be managed at a state or federal level often arises. This article is the first to investigate the Australian public's desire for a Commonwealth takeover of water resources. While the Federal Government's existing constitutional powers are extensive, uncertainties remain regarding the precise extent of its powers to regulate water resources. Given this reality, a Federal takeover of water resources is likely to require a constitutional amendment based on a double majority vote from both the Australian public nationally and from a majority of voters in a majority of the states (note, territories are counted in the national vote). Referendum success will depend on the public's preferences and views. However, despite some Senate enquiries into the matter, there has been no research into the broader public's views, how those views differ across states, or what motivates people to support Federal takeover of water management. Our case study of water management within Australia, focussing particularly on the MDB, provides important insights for other countries grappling with multilevel water jurisdiction.

## 2. Federal takeover calls in context

Balancing water allocation between various water users has been a challenge for the Commonwealth and states since Federation. European settlement created the need to coordinate water usage and flows in the River Murray, while the Federation Drought (1895–1902) led to the first major transboundary water agreement in 1915 (the *River Murray Waters Agreement*) along with the first national water institution (the *River Murray Commission* in 1917). However, varying state water needs led to continuous disagreements between states: New South Wales (NSW) and Victoria wanted water primarily for irrigation development, while South Australia (SA) initially prioritised water use for transport and set a requirement for minimum river flows (Connell, 2007). The need by SA for minimum flows has continued, with later demands shifting towards environmental purposes such as sufficient water in the River Murray to keep the Murray Mouth open (Settre and Wheeler, 2017).

An early proclamation also gave states the power to own and allocate water, without recourse to the First Peoples of Australia (Australian Government, 2017). To Australia's First Nations, water is fundamental to their culture, their dreaming stories, art, dance, and songs. Conversely, European settlers generally considered water as a resource to be manipulated and harnessed for economic gain (Taylor et al., 2016). While the Australian High Court has rejected the legal fiction of *terra nullius*, the issue of 'aqua nullius' is yet to be resolved and Aboriginal

people are still denied both economic and cultural water rights (Marshall, 2017).

Since the 1970s, increasing water scarcity and water quality concerns have led to a growth in water market adoption and legislation. Temporary water trade within the MDB occurred informally from the early 1980s, with more formal water trade legislation introduced in the 1990s (NWC, 2011; Wheeler, 2014). Major water reforms were also driven by the 1994 Council of Australian Governments (COAG) Framework (1994), which included a strategic framework for clarifying property rights, allocating water to the environment, trade arrangements, institutional reform, and public consultation and participation. This led to the implementation through state legislation of the *National Water Initiative* (NWI) in 2004 (COAG, 2004), which enabled the separation of water rights from land rights and the expansion of water markets across states (Crane et al., 2014; NWC, 2011).

During the 1990s and 2000s, with growing pressures for change, the Federal Government increasingly intervened to coordinate MDB water resources as a single region, culminating in the *Water Act* (2007) (Cth) ('Water Act'). This major piece of Federal legislation enabled the government to shift from facilitating state water reform to intervening in and managing the entire MDB (Owens, 2018; Webster and Williams, 2012), and was necessitated by a failure to implement cooperative framework water reform policies, first outlined in the COAG framework and the NWI (Webster and Williams, 2012). Key features of the Water Act included the MDB Plan (legislated in 2012) ('Basin Plan'), and the establishment of the Murray-Darling Basin Authority ('MDBA'), formed in December 2008. The Basin Plan's goal was to achieve sustainable water extraction within the Basin, and to return up to 3,200 GL (the 2,750GL originally targeted with an additional 450GL) from consumptive to environmental use (Grafton and Wheeler, 2018).

Despite decades of reform, the environmental sustainability of the MDB continues to deteriorate (DCCEEW, 2022; AAS, 2019). There are many reasons for this poor outcome, including state water management failure, lack of will from Federal authorities, systematic undermining of the Basin Plan by state governments and irrigators, and opportunities for destabilisation provided by the Federal constitutional framework (Holley and Sinclair, 2018; Kildea and Williams, 2010; Grafton and Williams, 2019). Communities and MDB stakeholders have also disagreed about what constitutes sustainable extraction levels in the context of competing water uses (see submissions to ASSC, 2021).

Jurisdictional interests under Australia's federal system have increased the complexity of the conflict (Kildea and Williams, 2010). As Connell (2013; 119) remarks, 'The management of large cross-border rivers such as the Murray-Darling system are typically characterized by considerable inter-governmental and inter-agency conflict, low decision-making transparency and accountability, high transaction costs, and ad hoc deals between competing subnational governments that undermine best-practice water management'. Government-to-government relations in this area are likely to worsen as climate change accelerates, and litigation will increasingly supplement regulation and management (Kildea and Williams, 2010; Connell, 2013). As such, the question of whether water should be managed at a state or federal level often arises.

## 3. Governance challenges under the current framework

### 3.1. Federal and state responsibilities

Water governance is widely recognised as an exercise in governing complexity. Much of the complexity with Australian water management issues arises from the terms of the 1901 *Commonwealth of Australia Constitution* (the Constitution). While states have broad and direct governmental authority over water resources within their borders pursuant to a general legislative power that is subject to constitutional limits, the Commonwealth has only those legislative powers that have been conferred specifically by the Constitution (Gardner et al., 2018).

<sup>1</sup> Namely the Commonwealth Government, the states of NSW, Queensland (QLD), Victoria (VIC) and SA, and the Australian Capital Territory (ACT).

With two exceptions, the Constitution is largely silent on water resources, which were intended to remain a state responsibility (Kildea and Williams, 2010). The exceptions being that the Federal Parliament has the power to legislate for navigation and shipping activities relating to commerce and trade; and that the states of NSW and Victoria can retain water access for irrigation and conservation – prohibiting the Commonwealth from creating trade laws that limit these rights. The Commonwealth may override inconsistent state laws; and state and Commonwealth laws are deemed invalid if they violate interstate trade or commerce. However, many aspects of this division of power remain to be tested (Kildea and Williams, 2010). NWC (2011) provides more detail on the history of water management in Australia.

The Millennium Drought in the 2000s resulted in the lowest inflows to the River Murray in recorded history, and arguably the most significant changes in water policy (Wheeler, 2014). Importantly, the Water Act established the parameters for a future MDB Basin Plan “to ensure the return to environmentally sustainable levels of extraction for water resources that are over-allocated or overused”; and “to protect, restore and provide for the ecological values and ecosystem services of the MDB”.<sup>2</sup>

The Australian Parliament passed the Basin Plan into law in 2012, entailing a series of plans, actions, and milestones, up until 2024 (MDBA, 2012). The Basin Plan established an integrated approach to managing MDB’s water resources for the first time through sustainable diversion limits (SDLs), which specify how much water may be taken for consumption from each catchment and, by extension, how much must be left for the environment, and must reflect an ‘environmentally sustainable level of take’. States must prepare water resource plans that are consistent with the Basin Plan and, if compliant, the Federal Minister must accredit the state plan.<sup>3</sup>

Individual water users continue to be allocated water at the state level through a series of legal mechanisms. Those mechanisms begin with the MDB Agreement, which forms a Schedule to the Water Act and allocates shares of the regulated River Murray system to NSW, Victoria and SA.<sup>4</sup> Water sharing plans under state water legislation then allocate this water through seasonal water allocation mechanisms and water entitlements.

As outlined under the latest legislated version of the Basin Plan, the Federal Government – through the MDBA – has the responsibility to define, monitor and enforce water market rules, as well as undertake annual monitoring, evaluation, and enforcement of the plan. Actual monitoring and enforcement occur at the state level. The MDBA is also tasked with: (a) Basin-wide planning and accreditation of state water plans; (b) SDLs; (c) annual environmental water allocations; and (d) environmental watering strategies. State governments have responsibility for: (a) developing state water plans; (b) determining state water allocations subject to water holdings and SDLs; (c) determining state environmental flows; and d) meeting inter-state and Commonwealth flow regime obligations (MDBA, 2020).

### 3.2. Reform challenges

During the development of the Basin Plan, politics compromised the recovery targets set by SDLs (Cruse et al., 2014; Owens, 2017; Owens, 2018; Grafton and Wheeler, 2018). A long history of state resistance to national water reform then made it difficult for state governments and the Federal government to cooperate to implement SDLs across the Basin (Connell, 2013). At the same time, water extractions have not always been well monitored by the states and there has been poor compliance with the caps that do exist on diversions in some areas (ASSC, 2018; Wheeler et al., 2020a). Public opinion has also been divided regarding

the extent and methods of water recovery for riverine environments (Wheeler, 2022). Currently, it has cost Australia just over \$2100 per megalitre (in long-term average annual yield equivalent (LTAAY)) to recover water through direct buybacks, and over \$6550 per LTAAY megalitre to recover through irrigation infrastructure subsidies (Grafton and Wheeler, 2018; Wheeler et al., 2023). The total volume of water entitlements recovered at mid-2023 to achieve environmental outcomes was 2,1074GL (MDBA, 2023), representing 77 % of the original 2,750GL diversion target reduction in the Basin Plan. Very little of the additional 450GL has been currently recovered.

The MDB now faces numerous challenges, in addition to the overarching challenge of climate change uncertainty. These include meeting water recovery targets; implementing the SDLs; developing and sanctioning regional water resource plans; progressing water supply projects; progressing environmental watering arrangements; maintaining productive community relationships; negative externalities from irrigation infrastructure subsidies; auditing and monitoring water use; corruption and rent-seeking behaviour; and establishing a robust monitoring and evaluation program (Hart, 2016; Grafton and Williams, 2019; Colloff and Pittock, 2019). At the same time, there have been advances to improve governance, with the Federal government introducing legislation to establish the Office of the Inspector-General of Water Compliance, which aims to strengthen compliance and enforcement powers in the MDB by creating new water theft and illegal water trading offences and penalties (Australian Government, 2021).

### 3.3. A complete Federal takeover of water resources?

As at mid-2023, the Australian government recognises that the original targets of the Basin Plan will not be fully implemented by mid-2024, and it has proposed delaying target deadlines to 2026–2027 (Plibersek, 2023). The Federal government is facing increasing pressure to take control of water recovery and override states, and it is not the first time these calls have been made.

A 2009 Senate Inquiry, while not recommending a referendum on Federal takeover, concluded that the Commonwealth should progress towards a full and unconditional referral of powers relevant to MDB management. In the absence of a full referral, the Inquiry suggested considering other options to provide for complete Federal management (ASSC, 2009). In the lead up to the 2010 Federal election, the leader of the Coalition Tony Abbott announced that the Coalition supported a Commonwealth takeover of the MDB, either by the states referring their powers or, if they refused, by the people voting at a referendum in 2013 to change the Constitution (Kildea and Williams, 2010; ASSC, 2021).

More recently, politicians have cited the problems caused by multiple jurisdictions, whereby states simply threaten to pull out of the Basin Plan if they feel outcomes are not in their best interests (Financial Review, 2019). The Senate raised the issue of ‘multi-jurisdictional management’ and the implementation of the Basin Plan again in 2019, when it established a Select Committee to investigate and report on responsibilities arising from the Basin Plan for the Commonwealth, states, and territories. It was also tasked with inquiring into a private members’ bill seeking to put the following question to the Australian people via referendum: whether the Constitution should be amended to give the Australian Parliament the power to make laws in relation to the use and management of water resources that extend beyond the limits of a state (ASSC, 2021: para 2.52).<sup>5</sup>

The Inquiry ultimately found that, while there were “frustrations” from many stakeholders, it was not clear that the Commonwealth would be a better water manager than the states. The Committee therefore endorsed the Water Act and Basin Plan as ‘the only viable model within which to continue to work to improve the river system and the communities that depend upon it’ (ASSC, 2021: para 2.93). While

<sup>2</sup> Water Act, s 3.

<sup>3</sup> Water Act, s 56.

<sup>4</sup> Water Act, Sch 1.

<sup>5</sup> Inquiring into the Constitutional Alteration (Water Resources) 2019 Bill.

acknowledging the need for further clarity and accountability in governance, the Committee highlighted the advantages of current arrangements in providing ‘a balance between the need for coordinated action and the need to reflect and meet local requirements in different parts of the Basin that are as varied and diverse as the Basin itself’ (ibid: para 2.95). Consequently, SA independent Senator Rex Patrick’s proposal to hand entire responsibility for the MDB to the Federal Government through a constitutional amendment was rejected in 2021 (The Guardian, 2021). However, water recovery and water reform within the states remain a source of frustration and ongoing conflict.

Finally, for any Commonwealth takeover of water resources to be certain, either a full referral of powers from the states or a referendum is needed. For a referendum to succeed, a majority of voters nationwide and a majority of voters in a majority of States (four out of six) must approve the changes. While there are conflicting arguments from experts about whether or not a Commonwealth takeover would succeed, little is known about the Australian public’s views towards a Commonwealth takeover. This study seeks to provide further evidence to suggest whether a Commonwealth takeover would be supported by the public; profiles the characteristics associated with those who believe a takeover is warranted; and provides further commentary on the socio-demographics and responses on ASSC (2021) submissions.

## 4. Data and methods

### 4.1. Data

The main data used in this study was collected from the Australian Survey of Social Attitudes (AuSSA), which is an ongoing primary data source that studies Australians’ social attitudes, beliefs, and opinions. Five thousand citizens were randomly selected from the Federal electoral roll in December 2020. Each citizen was posted an explanatory letter in February 2021, followed by a questionnaire booklet and reply-paid envelope, with up to three reminder mailings sent. After ineligible addressees were excluded, the final response rate was 25 %, with 1,162 completed questionnaires.

The question of interest in this study is the statement regarding respondents’ support for a Commonwealth takeover of water management in Australia. The exact wording was “Currently water resources in Australia are managed by the states. Do you support a Commonwealth takeover of water management in Australia?” Respondents answered on a Likert scale from 1 = strongly agree to 5 = strongly disagree. This question was asked after two questions regarding environmental water recovery in the MDB. 136 respondents did not answer the question and were coded as neutral (we also conducted sensitivity testing and dropped these respondents altogether, finding that the results did not change). McNeil et al. (2021) provides a copy of the survey instrument. Sampling weights were applied to the raw data to account for state populations.

In addition, we collected and coded information from publicly available ASSC (2021) submissions to supplement and complement our survey findings. Appendix B provides this additional information.

### 4.2. Regression method

Given the dependent variable, an ordered probit/logit model (Eq. (1)) was used to determine what characteristics are significantly associated with respondents’ support level for a Commonwealth takeover of water management.

$$y_i^* = x_i\beta + \sigma\epsilon_i \quad (1)$$

The dependent variable  $y^*$  is a latent variable measuring the exact but unobserved extent of support for a Commonwealth takeover of water management;  $x$  is a vector of independent variables representing the attitudinal and socio-demographic characteristics of the respondents;  $\beta$  is a vector of parameters; and  $\epsilon_i$  is an error term often assumed to have a

constant variance (constant  $\sigma$ ) and either a logistic (ordered logit) or normal (ordered probit) distribution. We observe  $y_i = 1$  (strongly disagree) if  $-\infty < y_i^* \leq \mu_1$ ;  $y_i = 2$  (disagree) if  $\mu_1 < y_i^* \leq \mu_2$ ;  $y_i = 3$  (neutral) if  $\mu_2 < y_i^* \leq \mu_3$ ;  $y_i = 4$  (agree) if  $\mu_3 < y_i^* \leq \mu_4$ ; and  $y_i = 5$  (strongly agree) if  $\mu_4 < y_i^* < +\infty$ , where  $y_i^*$  is a latent variable of observed  $y_i$ ,  $\mu_1, \mu_2, \mu_3$  and  $\mu_4$  are parameters to be estimated by the ordered probit model. When  $\sigma$  is not the same for all observations, residuals are heteroskedastic: the  $\beta$  vector estimates and the associated standard errors will be incorrectly estimated (Williams, 2010). The heterogenous choice model corrects for heteroskedastic residuals by explicitly specifying the determinants of heteroskedasticity in a second equation in addition to Eq. (1). The second variance equation is:

$$\sigma_i = \exp\left(\sum_j z_{ij}\gamma_j\right) \quad (2)$$

where  $z$  is a vector of  $j$  variables, defining observations with different error variances in the underlying latent variable  $y_i^*$ . The  $z$  vector of variables may include dummy variables such as gender and location and continuous variables such as age and years of education.<sup>6</sup> The heterogenous choice model can be estimated by the user written command `oglm` (ordinal generalised linear models) in Stata (Williams, 2010). When  $\gamma_j$  in Eq. (2) is not significantly different from zero,  $\sigma$  becomes one and the heterogeneous choice model becomes the same as the ordered probit or logit models.<sup>7</sup> The definitions and summary statistics of the independent variables are presented in Appendix A, and full model results are presented in Table 2. The coefficients of the independent variables in Table 2 are the vector of  $\beta$  in Eq. (1), and the robust standard errors are associated with the coefficients.

A range of attitudinal, socio-demographic and locational variables were chosen to model respondent’s views towards a Commonwealth takeover. Correlations ( $|r| < 0.8$ ) and variance inflation factors ( $VIF < 5$ ) were checked to ensure no serious multicollinearity. Sample weights were used to account for the survey sampling design and robust standard errors are used to further correct for heteroskedasticity. Sample weights were derived from calibration against national adult citizen population benchmarks of age, sex and education.

## 5. Results

### 5.1. Overall results

Fig. 1 and Table 1 shows the state support level for a Commonwealth takeover of water management in Australia. Overall, less than four in ten people (35 %) in Australia support a takeover. MDB states (NSW, ACT, VIC, QLD and SA) display a higher level of support than non-MDB states. Within MDB states, apart from ACT (56 %) which had a small sample size, SA has the highest support level with 50 % of respondents strongly agreeing or agreeing, followed by NSW respondents (39 %), while VIC (35 %) and QLD (31 %) have the lowest support. NSW respondents have the highest percentage in the neutral position. Non-MDB states clearly disagree more with the idea of a takeover, with only 19 % agreeing/strongly agreeing, and 40 % disagreeing/strongly disagreeing. Accordingly, in only two states there may be a majority vote for a Commonwealth takeover.

Table B1 in Appendix B provides the results of our analysis of submissions to the ASSC (2021). Amongst the key results of interest are the

<sup>6</sup> We have tested age, gender, education years for sources of heteroskedasticity and the results suggest  $\gamma$  is only statistically significant for age.

<sup>7</sup> The `oglm` can specify both probit and logit functions for the error distribution. While we reported the probit function in the manuscript, statistical significance and marginal effects of probabilities between the probit and logit specifications are very similar. However, the chi-2 statistic of the model is not statistically significant for the logit specification.



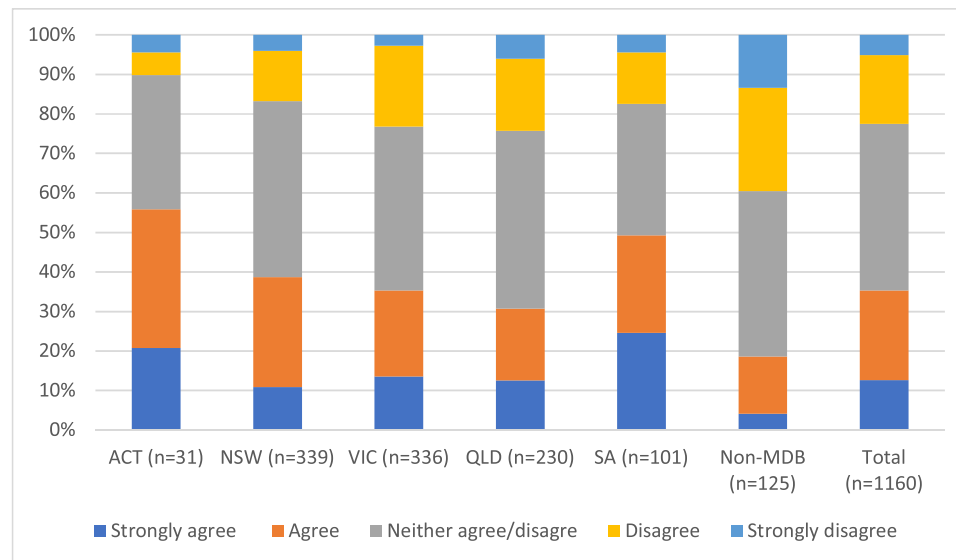


Fig. 1. Support for a Commonwealth takeover of water management in Australia by state (adjusted by sampling weights).

Table 1

State support for a Commonwealth takeover of water management in Australia (sample weighted %).

	ACT	NSW	VIC	QLD	SA	Non-MDB	Total
Strongly agree (%)	21	11	14	13	25	4	13
Agree (%)	35	28	22	18	25	15	23
Neither agree/disagree (%)	34	45	42	45	33	42	42
Disagree (%)	6	13	20	18	13	26	17
Strongly disagree (%)	4	4	3	6	4	13	5
Total (%)	100	100	100	100	100	100	100

Notes:

<sup>1</sup>Due to rounding, totals may not add exactly to 100 %.

<sup>2</sup>Pearson chi2 test suggest there is a significant ( $p < 0.01$ ) association between support and state.

fact that only 38 % of submissions addressed the question of Federal takeover of water resources, while 62 % ignored it. Of the submissions that responded to the question: 43 % disagreed; 7 % agreed; and 50 % did not agree/disagree but provided additional comment. Those that disagreed with Federal takeover were more likely to be from an agricultural group, and be located in NSW, a national body and Victoria.

Only two organisations said “yes” – one an environmental group and one an agricultural group. Of the submissions that provided some commentary on Federal takeover, there was lukewarm support for increasing Federal involvement in other water management areas. These submitters were more likely to be from NSW and SA, and from university, state government and community stakeholder groups.

## 5.2. Modelling results

The results of heterogeneous choice model for ordered probit are displayed in Table 2. The statistically significant Wald Chi2 statistic suggests that the regression model fits well overall. In terms of socio-demographic variables, there was a quadratic significant relationship between age and support for a Commonwealth takeover. Support increases as age increases, reaching a peak at age 51, and decreases afterwards, suggesting that the young and the old are generally less willing to support a takeover than the middle-aged. The socio-economic characteristics of: male; married; lower education; higher children; white-collar occupation; retired; and owning house outright were significantly positively associated with more support for a Federal takeover.

Political party preferences were not significant.

MDB state respondents (with separate dummies for NSW, ACT, VIC, QLD and SA) are more supportive than non-MDB respondents (TAS, NT, WA). Within the MDB states, SA has the highest level of support, followed by ACT, then NSW, VIC and QLD. Once state dummies were controlled for, the separate MDB dummy was not significant, while the outer remote location dummy was negative and weakly significant. Somewhat surprisingly, respondents' attitudes towards climate change, the importance of environmental issues in Australia, specific water shortage and quality problems, and economic growth versus environmental issues, were not significantly associated with support. However, some attitudinal trust variables were significant. In particular, the level of trust in information provided by university researchers and the Federal government was strongly associated with support for Federal water takeover.

## 6. Discussion

The results highlight that the surveyed public is far from convinced of the need for a Commonwealth takeover of water resources. Less than four in ten people support takeover overall and there is a potential majority vote in only two states. Extrapolating these results to the population of Australia suggests that a referendum on this question would probably fail. However, what is also clear from Table 2 is that respondents in MDB states are much more supportive of a takeover than respondents elsewhere. Respondents living in urban communities in the ACT and the downstream state of SA, and those having a higher level of trust in the Federal government and university research in general, were much more supportive. Trust levels have often been shown to be important elsewhere, with the literature suggesting that perceived discrimination, powerlessness and exclusion can diminish trust (Beierle and Konisky, 2000). Other research on irrigators' trust issues towards MDB water management has shown that NSW irrigators generally held more negative views towards government and the MDBA than Victorian or SA irrigators (Wheeler et al., 2017), which is similar to results here. Many comments in the submissions to ASSC (2021) that strongly disagreed with the concept of Federal takeover commented specifically on locational and trust issues. As an example of trust, the SA River Lakes and Coorong Action Group stated: "While it seems logical to have the power of implementing the Basin plan in the hands of the Commonwealth, we do not trust politicians to enact the plan in a fair and equitable way", and as such they disagreed with a Federal takeover concept,

**Table 2**

Heterogenous choice model results for supporting a Commonwealth water takeover.

Variables	Coefficient	Robust Std. Err.
<i>Socio-economic</i>		
Age	0.067***	0.022
Age-squared	−0.001***	0
Female	−0.404**	0.158
Married	0.299*	0.177
Australian born	−0.018	0.158
education	−0.108***	0.032
labour force (reference = blue-collar)		
White-collar	0.544**	0.239
Retired	0.424*	0.242
Other	0.292	0.239
2019 Federal election vote (Reference = labour)		
Liberal	−0.03	0.182
National	0.006	0.319
Green	0.157	0.26
Other	−0.063	0.202
Children	0.156*	0.087
Society group from 1 to 10 (poorest to richest)	0.072	0.051
Homeownership (Reference = own outright)		
Own but has mortgage	−0.750***	0.244
Rent and others	−0.476**	0.21
<i>Attitudinal</i>		
Climate change impact perception for Australia	0.007	0.035
Attitude on economics versus environment	−0.063	0.137
Water shortage & water pollution as most imp't environ problem for Aust	−0.074	0.182
Environment rated as most & second most imp't issue for Aust. today	0.058	0.156
Efficacy of individual actions in addressing environ. issues	−0.149	0.100
Trust in others	0.053	0.061
Trust in information provided by university	0.098**	0.043
Trust in information provided by media	−0.008	0.033
Trust in information provided by industry	−0.049	0.045
Trust in information provided by Fed. Gov	0.107***	0.035
<i>Locational</i>		
Remoteness (Reference = major cities)		
Inner Regional	−0.062	0.214
Outer, remote and very remote	−0.530*	0.273
Reside in the MDB	0.411	0.306
State (Reference = non-MDB states)		
NSW	1.211***	0.316
ACT	1.237***	0.547
VIC	1.038**	0.285
QLD	0.779***	0.279
SA	1.385***	0.388
<i>Variance function</i>		
Age	0.010***	0.003
$\mu_1$	−1.22	1.103
$\mu_2$	0.342	1.014
$\mu_3$	2.392**	0.95
$\mu_4$	3.835***	0.952
N	1159	
Residual degree of freedom	1119	
Wald chi2 statistic (df = 36)	56.61**	

Note: \*\*\* and \*\* represents statistical significance at 10 %, 5 % and 1 % levels, respectively.

but supported current governance reform. The Border Rivers Food and Fibre group (QLD) commented on locational issues with: "The MDB Plan has always been about protecting SA federal seats under a cloak of environmental concern." In terms of those that agreed with Federal takeover, such as NSW's Dubbo Environment Group, they stated: "NSW does not have ownership of this Basin. Our group wants the whole of the Basin to receive its fair share. We want our river systems managed by an honest, publicly accountable Federal administrator."

The lack of public trust in government, reflected both in the public survey results and our ASSC (2021) analysis, may be related to the fact that previous takeover proposals have not specified *how* the takeover will occur or *which* powers will be transferred (Kildea and Williams,

2010). Indeed, our analysis in Appendix B highlights that, while the majority of submissions did not mention Federal *takeover* of water resources, over 70 % did suggest ways to increase Federal *involvement*.

From a legal perspective, the Commonwealth has a variety of potential options for managing the Basin under the Constitution, ranging from full voluntary referral by states; to 'negotiated incremental' efforts based on existing powers and referrals (where all governments have a role); to the Federal Government using its existing powers to seize control from the states (ASSC, 2009). The Federal Government, for instance, has numerous potential options under the expansive corporations and external affairs powers, as well as overseas trade and commerce (Webster and Williams, 2012). The trade and commerce power can be used, for example, to regulate commercial activities in, on, and under rivers across state borders, as well as the interstate water market, subject to any challenges arising under section 100 of the Constitution. Under this head of power, the Commonwealth can also regulate *intra-state* commercial activities when they are sufficiently linked to interstate or overseas trade or commerce.<sup>8</sup> However, it is unclear whether this incidental scope would extend to Federal water regulation within a state for goods not intended for interstate or international trade (for example, preventing pollution or depletion of river flows) (Gardner et al., 2018: 104).<sup>9</sup>

Under the corporations power, the Federal Government can regulate water corporations that are engaged in the water resources industry, along with water use by all corporations (Gardner et al., 2018). However, this power does not extend to unincorporated entities that are not using river water for business purposes (Kildea and Williams, 2010). The external affairs power confers on the Federal Government broad, almost 'plenary' powers to meet its obligations under international treaties.<sup>10</sup> The Water Act implements Australia's obligations under the Ramsar Convention on Wetlands of International Importance, for example, to promote the conservation and 'wise use' of 16 Ramsar-listed wetlands. Some (e.g. Pittcock, 2008) have suggested additional Montreux Record listing of the key Ramsar-listed sites whose ecological character has changed, which may be another avenue for action in the future. However, in terms of the scope of the acquisition of property on just terms power, this remains uncertain, particularly in relation to whether water access rights constitute 'property' in this context.<sup>11</sup> Importantly, the Commonwealth may be required to pay just terms compensation if it takes over the states' water rights (Gardner et al., 2018: 123).<sup>12</sup> Appendix C elaborates with more discussion.

In our view the partial implementation of MDB water policy is more a question of political priorities and interpretation of the Water Act than the scope of the Commonwealth's constitutional powers. It is likely to be more realistic and, ultimately, more effective for the Federal Government to utilise the tools that already exist under the Water Act than proceed with a Federal takeover. Our analysis of submissions to ASSC (2021) in Appendix B suggests the following areas were often cited by respondents for increased Federal involvement: governance; monitoring; reporting; restarting buybacks; climate change action; environmental watering; federal Royal Commission; holding states to account for non-delivery of water resource plans; cultural water issues; and

<sup>8</sup> See, for example, *O'Sullivan v Noarlunga* (1954) 92 CLR 565; Gardner et al. (2018: p.104).

<sup>9</sup> *Lee v Commonwealth* (2014) 220 FCR 200 at [126]; [2014] FCAFC 174 at [122]–[123]; Gardner et al. (2018: 102–4)

<sup>10</sup> Subject to restrictions identified in the *Tasmanian Dam case* (1983) 158 CLR 1, for example the Commonwealth legislation must be a 'faithful pursuit' of the purpose of the convention.

<sup>11</sup> See *ICM Agriculture v Commonwealth* (2009) 240 CLR 140, applied in *Arnold v Minister Administering the Water Management Act 2000* (2010) 240 CLR 242.

<sup>12</sup> However, there would be no need for fair compensation if state property were acquired by way of a referendum as s 51(xxxi) only applies to federal legislation.

groundwater linkages. The Inland Rivers Network and other submissions, for example, called for the National Water Commission to be reinstated so that independent research and oversight could be undertaken using a consistent, transparent and scientific approach. The Federation of Victorian Traditional owner Corporations and NBN & MILDREN made recommendations concerning the "rights and aspirations" of First Nations in relation to access, ownership and management of water.

With the re-submission of NSW's water resource plans in 2023, the Minister for Water may no longer need to consider certain step-in powers in relation to water resource planning, but there are a number of other areas where we consider increased Federal water involvement is warranted (Wheeler et al., 2020a; Martin et al., 2023). Areas of change could include re-establishing the National Water Commission, along with a central body that is well resourced and works in conjunction with states to increasingly use satellite data for monitoring, and measurement; establishing effective water audits and water accounts; repealing the 2015 legislative cap on buybacks; reallocating funds away from supply and efficiency projects to voluntary buybacks and withdrawing funding when states do not meet commitments; addressing cultural water justice issues; integrating the latest climate science; conducting a water audit and further implementation of water accounting; and reinforcing (and financing properly) the Inspector-General of Water Compliance office.

The Commonwealth must also play a greater role in addressing proper rural structural adjustment and investing in rural and remote communities. Socio-economic issues have derailed much Basin water policy in the past, and climate change will continue to force farm exits in the future (Wheeler et al., 2020a, 2020b), hence reinvesting in economic and social services will be critical for many rural and remote communities. Upcoming statutory reviews of the Water Act (by 2025) and the Basin Plan (in 2026) will provide an opportunity to consider some of these fundamental issues (Martin et al., 2023). Indeed, change has recently been signalled by the Federal Government, recognising that current water recovery targets cannot be met by mid-2024 (Plibersek, 2023).

A final point is that the Australian experience is instructive for other transboundary river contexts. The MDB provides a classic example of a transboundary river basin contained within one country, where jurisdiction is shared across different political boundaries. While it provides lessons regarding market-based water allocation, integrating environmental protection with water allocation, and developing regional governance institutions that coordinate horizontally and vertically within a unified governance regime, it is important to note that it is not the only model (Karkkainen, 2018). Other countries are also attempting to align legal and physical boundaries to achieve multi-jurisdictional governance that is appropriately scaled and integrated at the basin level, and based on local needs. Examples include China's 2020 Yangtze River Protection Law (Li and Jin, 2023). Further cross-country comparison research on how to make water governance in various transboundary water basins more efficient, and equitable, at all levels of governance, is clearly needed in an era of growing world climate change.

## 7. Conclusion

Calls for a Commonwealth takeover of water resources in Australia have become increasing common due to environmental and social sustainability issues associated with overallocation, governance problems

and challenges in meeting current MDB targets. Under the 1901 Australian Constitution, states were given the power to distribute water ownership and allocation. Federal government powers to regulate water resources are extensive, but questions remain regarding their precise extent. Given these uncertainties, broadscale Commonwealth takeover is unlikely without a successful public referendum on a constitutional amendment. The majority of voters nationwide, along with a majority of voters in a majority of States (four out of six), must approve the changes. Ours is the first study to investigate the Australian public's views towards a Federal takeover. Using a nationwide survey conducted in 2020, it was found that there was only lukewarm support for a Commonwealth takeover of water resources, with less than four in ten participants supporting the proposal. SA and the ACT were the only states where there was a slight majority in favour.

Analysing respondent characteristics associated with takeover support, we found that location was associated strongly with agreement: if a person lived in a MDB state, they were more favourable. In addition, if they lived in SA – which suffers the most from water issues as being the downstream state in the MDB – they were the most likely to support a takeover. Other significant socioeconomic characteristics that increased the likelihood of agreeing to Commonwealth takeover included: not living in an outer or remote area; being middle aged; having lower education in general; having more children; home ownership and trusting the Federal government and university researchers in general.

Although we conclude that a complete takeover by the Federal government is highly unlikely to succeed in any public referendum at this stage, and that there are good reasons why not to proceed down this path, many have indicated that there are other areas where increasing Federal water governance would be beneficial, including fully utilising Federal Government powers under the Water Act. There are a range of potential changes that could be implemented at the Commonwealth level to increase the effectiveness of Australian water institutions, from re-establishing national water institutions, repealing legislation, reinstalling water buybacks, addressing rural structural adjustment issues more effectively, conducting water audits and water accounts, enforcing water resource plans, reducing and removing budgets for recalcitrant states, addressing cultural water rights, incorporating the latest climate science and reinforcing national water compliance.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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## Appendix A Variable definition and descriptive statistics ( $n = 1159$ )

Variable	Mean	Std. Dev.	Min	Max
Commonwealth takeover of water management (Likert scale from 1 = strongly disagree to 5 = strongly agree)	3.244	1.086	1	5
Age <sup>1</sup>	57.41	16.52	17	94
Female (dummy)	0.514	0.500	0	1
Married (dummy)	0.577	0.494	0	1
Australian born (dummy)	0.737	0.441	0	1
Education (years) <sup>2</sup>	14.12	3.69	6	30
Labour force status (reference = blue-collar occupation)				
White-collar (dummy, <i>n</i> = 453)	0.391	0.488	0	1
Retired (dummy, <i>n</i> = 318)	0.274	0.446	0	1
Other (dummy, <i>n</i> = 165)	0.142	0.349	0	1
2019 Federal election vote (Reference = labour)				
Liberal (dummy, <i>n</i> = 438)	0.378	0.485	0	1
National (dummy, <i>n</i> = 93)	0.080	0.272	0	1
Green (dummy, <i>n</i> = 100)	0.086	0.281	0	1
Other (dummy, <i>n</i> = 185)	0.160	0.365	0	1
Children in household (number)	0.387	0.855	0	8
Society group perception from 1 to 10, poorest to the richest	6.035	1.529	1	10
Homeownership (Reference = own outright)				
Own, or mortgage (dummy, <i>n</i> = 325)	0.280	0.449	0	1
Rent and others (dummy, <i>n</i> = 302)	0.261	0.440	0	1
Climate change impact perception for Australia (reverse-coded, where here 0 = extremely good to 10 = extremely bad)	6.873	2.432	0	10
Attitude on economics versus environment <sup>3</sup>	2.643	0.789	1	5
Attitude on water shortage and water pollution as the most important environmental problem for Australia as a whole (dummy)	0.255	0.436	0	1
Attitude on environment as most or second most important issue for Australia today (dummy)	0.401	0.490	0	1
Attitude on efficacy of individual actions in addressing environ. issues <sup>4</sup>	3.496	0.900	1	5
Trust in others (from 1 = can't be too careful, to 5 = most people trusted) can be trusted)	3.175	1.282	1	5
Trust in information provided by university research centres <sup>5</sup>	6.731	2.311	0	10
Trust in information provided by news media <sup>5</sup>	3.750	2.351	0	10
Trust in information provided by industry <sup>5</sup>	5.057	2.033	0	10
Trust in information provided by federal government <sup>5</sup>	4.755	2.555	0	10
Remoteness (Reference = major cities)				
Inner Regional (dummy, <i>n</i> = 299)	0.258	0.438	0	1
Outer, remote and very remote (dummy, <i>n</i> = 160)	0.138	0.345	0	1
Reside in the MDB (dummy)	0.130	0.337	0	1
State (Reference = non-MDB)				
NSW (dummy)	0.292	0.455	0	1
ACT (dummy)	0.027	0.160	0	1
VIC (dummy)	0.263	0.441	0	1
QLD (dummy)	0.205	0.404	0	1
SA (dummy)	0.088	0.283	0	1

<sup>1</sup> Three observations were discarded that had an age above 95.

<sup>2</sup> There were five observations with implausible values, such as less than 4 fulltime education years. These observations were double checked against the highest education attainment variable and consequently replaced with the correct years of education.

<sup>3</sup> Average Likert scale (1 = strongly disagree to 5 = strongly agree) for four statements: 1) Modern science will solve our environmental problems with little change to our way of life; 2) We worry too much about the future of the environment and not enough about prices and jobs today; 3) People worry too much about human progress harming the environment; 4) In order to protect the environment Australia needs economic growth.

<sup>4</sup> Average Likert scale (1 = strongly agree to 5 = strongly disagree) for two statements: 1) It is just too difficult for someone like me to do much about the environment; 2) There is no point in doing what I can for the environment unless others do the same. Higher scores indicate a higher level of efficacy.

<sup>5</sup> Likert scale from 0 = no trust at all to 10 = complete trust.

## Appendix B Additional analysis of submissions to the Senate enquiry on the multi-jurisdictional management and execution of the MDB plan (2021)

In an additional analysis, we analysed all the submissions to ASSC (2021), which as noted was charged with considering state and territory water resource management, and Federal basin-wide or cross jurisdiction oversight. There were 63 publicly available submissions. All submissions were reviewed and coded in a database, with relevant details on organisation; state; type of stakeholder group; whether the submission provided any comment on Federal takeover of water resources; the nature of their comment; and other relevant information noted. Table B1 below provides a summary of the key results from the analysis.

**Table B1**  
Summary of Submission Responses (%) to the Federal Involvement Question in the Senate Inquiry.

Description	Category of Response			
	None provided	Yes - provided	Other – Some comment	Total
Whether there was a response within the submission on increasing Federal involvement/takeover of water resources (%) <sup>1</sup>	62 <sup>4</sup>	18	20	100
	<b>Not Supportive</b>	<b>Yes Supportive</b>	<b>Other – comment on increasing some level of Federal involvement in water oversight</b>	<b>Total</b>
If the submission provided a comment on Federal involvement, was it supportive? (%) <sup>2</sup>	43	7	50	100

(continued on next page)



Table B1 (continued)

Description	Category of Response			Total
	None provided	Yes - provided	Other – Some comment	
Location of submissions (%) <sup>3</sup>	NSW = 32; National = 27; VIC = 23; SA = 9; QLD = 9	NSW = 100	NSW = 33; SA = 27; QLD = 13; National = 13; VIC = 7; ACT = 7	
Stakeholder group of submissions (%) <sup>3</sup>	Agriculture = 82; State gov. = 9; Environment = 9	Environment = 50; Agriculture = 50	University = 47; State gov. = 27; Community = 20; Environment = 7	

Notes: 1. There were 63 submissions, however a number had multiple attachments, and each attachment/submission was individually assessed. Hence, the percentages are based out of all the documents in total (namely 74).% may not add to 100 due to rounding.

<sup>1</sup> The % are based on the 28 documents that provided a 'yes' or 'other' response on Federal involvement.

<sup>2</sup> The % are based on the documents in the corresponding cell above each % in the row 'If the submission provided a comment on Federal Involvement, was it supportive?'.

<sup>3</sup> Of the 46 submissions (62% of total) that did not provide a response whether Federal takeover in water was warranted, 24 (namely 52% of the 46 submissions) submissions did provide comment where increasing involvement may be considered.

## Appendix C Additional discussion on Federal water management powers

A Federal takeover could also be achieved by a referral of powers from the states, but this option has certain limitations. As a starting point, referrals are usually partial. A referral by SA only, for example, will not advance the Commonwealth's objectives. It is also unclear what would happen if a state revoked its referral of legislative power to the Commonwealth. The SA Royal Commission observed that such revocation would raise 'a complex constitutional question as to whether all of the Water Act or Basin Plan would continue in force' (Walker, 2019: p. 52). If the Water Act and Basin Plan are not able to continue to be implemented, it is unclear what law might be in place to define the rights of states (if any), and these difficult constitutional questions have not been addressed by the High Court (Webster, 2019).

Any federal takeover proposal would also have to address the difficult question of whether the Commonwealth should administer water resources entitlements, a critical function that MDBA has indicated can only be effectively performed at the state level (Kildea and Williams, 2010; ASSC, 2021). Accordingly, it is for both constitutional and practical reasons that state law remains the foundation for water resources entitlement regimes in Australia (Gardner et al., 2018: 123).

The Australian Competition and Consumer Commission (ACCC) has recently hinted at a potential federal takeover of MDB water markets, along with licensing of water brokers and new robust rules and oversight. The ACCC completed the final report into MDB water markets in April 2021, finding that governance has been focussed on key objectives such as protecting the environment and the timely delivery of water, but that there has been a lack of attention on ensuring water trading markets were working fairly and efficiently (ACCC, 2021). The report recommended a new independent 'Water Markets Agency' be established to oversee trading and ensure water markets in the Basin operated fairly and with integrity.

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