Equity, Fairness and Justice in Water Policy

Framing policy debates in Public Inquiry Submissions, Hansard and Social Media

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Data and code availability

All code to reproduce the analysis in this paper is available at https://doi.org/10.5281/zenodo.14862442; submissions are available at the web addresses listed in the Appendix; Parliamentary speeches are at https://www.aph.gov.au/Parliamentary_Business/Hansard; Twitter data are available on request from the Australian Digital Observatory.

Contribution statement

Each listed author has made a significant intellectual contribution to the work, as follows: *Sam Hames*[1], conception and design, contribution of knowledge, data acquisition, data analysis and interpretation, report drafting, report review; *Rod Marsh*[2], conception and design, contribution of knowledge, data analysis and interpretation, report drafting, report review.

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Watertrust Australia acknowledges the Traditional Owners of land, sea and waters across Australia and their continuing connection to culture and Country. We pay our respects to Elders past and present.

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Summary

Framing fairness in Murray-Darling Basin water policy conflict

Water policy in the Murray-Darling Basin is a focal point for political conflict shaped by competing interests and long-standing tensions. Ideas of equity, fairness and justice are used by interest groups attempting to influence the political processes that determine who gets access to water resources and under what conditions.

Water policy in the Murray-Darling Basin (Basin) has been politically contested for over a century, with conflicts dating back to pre-Federation Australia. These disputes highlight the complexities of subnational hydropolitics, where managing water intersects with diverse policy and political issues, providing a platform for broader conflicts among governments, communities, advocacy groups, and partisan interests.[1] Over time, these conflicts have led to a series of negotiated political settlements aimed at balancing competing demands. One notable example is the River Murray Waters Agreement, likely Australia's longest-standing interstate compact, which has evolved through more than 15 iterations into the current Murray-Darling Basin Agreement.[2]

As Harold Lasswell observed, politics is about "who gets what, when, and how." This principle is evident in the Basin, where decisions about water allocation reflect power dynamics among governments and other interests. Political actors often frame policy options in ways that justify their claims and aim to influence broader public opinion. Fairness, equity, and justice are frequently invoked in these debates about water policy, linked to ideas that people – and nature – should receive what is due to them. Participants in policy debates use the rhetoric of fairness to advance their own interests. This can obscure the real tradeoffs at stake, making it harder to find workable solutions.[3]

The political salience of concepts like "equity", "fairness" and "justice" (fairness concepts) for water policy is shown by their prevalence in Parliamentary debates, second-reading speeches, policy documents and legislation relating to water policy in the Basin. However, a prominent study from the late 1990s found that:

> Government policies constantly state that resources will be allocated "equitably", yet the area that has received least attention is the *definition of what is "just", or "fair" or "equitable"* as seen by the range of stakeholders in water allocation decisions. [original emphasis][4]

Only limited work has been done to address this issue in the intervening decades (see our companion literature review).[5] While there has been a considerable amount of scholarship on "water justice" that has advocated for particular political positions, there has been less work done that provides an overall examination of the different ways stakeholder groups understand and use fairness concepts in political contests.

This paper presents an exploratory analysis of over 1800 submissions made to seven public inquiries over the last 10 years, second-reading speeches for key water Federal water legislation from 2007-2023, and five years of tweets from 2018-2023 to better understand how policy constituencies, advocacy coalitions and citizens understand fairness concepts. The analysis draws on corpus linguistics tools to explore the language stakeholders use to frame water management issues in the political contest over how the authority of the state will be deployed to determine "who gets what, when and how." Rather than assessing the validity of any particular perspective on fairness, our study aimed to map the diverse ways in which different groups invoke and interpret fairness concepts, providing a clearer picture of how these ideas shape political debate.

Framing water policy issues is central to shaping political debates and influencing policy outcomes.

Framing, or the strategic presentation of issues, plays a pivotal role in the political contests over water in the Basin. Political actors use frames, narratives, and storylines to shape debates, highlighting certain issues while downplaying others. Concepts like equity, fairness, and justice are central to the development of frames deployed in policy debates, but their meanings differ across interest groups, reflecting competing narratives.

Framing contests emerge when these narratives compete to dominate public and policymaker perceptions. Successful frames shape not only which issues are discussed but also how they are understood and resolved, influencing the broader policy landscape. For policymakers, understanding how stakeholders frame key concepts is critical to navigating these complex debates.

While there is often broad agreement on general principles, such as the idea that "government decisions should be fair", disagreements arise over how such principles should guide decisions and trade-offs. By analysing the frames employed by stakeholders, policymakers can better understand the "terms and conditions" different groups attach to their interpretations of fairness, equity, and justice.

We used submissions to public inquiries about water policy in the Basin to examine how interest groups frame fairness to influence policy outcomes. Corpus-assisted analysis provided a systematic approach to studying these frames across a large number of submissions.

To understand how interest groups use fairness concepts, we analysed over 1,800 submissions to seven public inquiries about water policy in the Basin, along with Hansard debates in Federal Parliament. Using corpus linguistics tools, we systematically examined patterns in word usage and distribution to uncover the frames and narratives deployed by interest groups.

Corpus linguistics enabled us to identify storylines that underpin policy debates, revealing the moral evaluations and policy preferences of key actors. This rigorous, data-driven approach minimised selection bias and subjectivity, offering a comprehensive view of the frames employed in submissions. By applying these techniques, we gained insights into how political actors selectively present facts and construct narratives to shape policy discussions to influence outcomes.

Our analysis demonstrates how fairness concepts are embedded within broader frames used to define policy issues, outline the role of government, and propose acceptable solutions. This systematic approach highlights the strategic use of language in framing debates and provides policymakers with tools to navigate the complex dynamics of contested water policy discussions.

Our analysis identified two main categories of frames—broad and narrow—and enabled us to analyse submissions from different interest groups based on their language. Keyword and concordance analyses alongside topic modelling techniques provided deeper insights into how these groups framed water policy issues.

Broad frames were used by agricultural, environmental, First Nations, and regional groups, with detailed storylines aimed at framing contests over water management and reshaping the policy landscape. Narrow frames, in contrast, were used by commercial non-consumptive and resource management groups, focusing on incremental policy adjustments within existing frameworks rather than systemic changes.

Some submissions reflected institutional norms that made explicit framing less discernible. For example, government agencies, researchers, and Parliamentary speeches often adhered to institutional genres that mirrored their roles within established policy structures.

While many groups addressed similar topics, their use and emphasis on specific keywords varied significantly, reflecting their strategic priorities. These variations exposed the moral evaluations and policy preferences underlying each group's framing.

Our analysis also examined the application of these frames beyond inquiry submissions. Hansard debates (see the Elected Representatives section) demonstrated how these frames were deployed in Federal Parliamentary discussions. However, our social media analysis (see the Twitter Analysis section) found little evidence of these frames being repeated here.

Through an initial review of inquiry submissions, we developed a typology of stakeholder groups, which we used to categorise and analyse the frames. The following sections summarise the frames and provide further insights into the narratives shaping water policy debates.

Broad frames

1. **Agricultural** submissions frame fairness in terms of the imbalance between environmental and agricultural priorities. Farmers are unfairly burdened by water recovery targets and market structures that favor outside interests. Water recovery targets are ideologically driven by environmentalists living in urban communities who do not understand or value the importance of agricultural work in the Basin's communities and landscapes. Market structures favour well-funded, large corporations and speculators over family farmers. This narrative of injustice centres on the moral breach of an implicit contract between government and rural communities, where farming families, who contribute to national food security and economic stability, are left vulnerable to policy decisions that prioritise environmental outcomes. The fairness framing highlights the difficulties farmers face in competing in water markets, the economic and social impacts of water recovery, and the perceived inequities in how burdens are distributed across regions. Salient terms such as "appalled," "frustrated," and "sacrificed" capture the emotive force behind claims of unfairness, while procedural concerns about governance and the market's design emphasise the need for equity in policy implementation. This frame has strong resonances with one of the Regional frames.

2. **Environmental** submissions frame water management as unfair, demanding radical changes to the current system, which favours irrigation and big business at the expense of the environment. The environment is most likely to be personified in the environmental frame, which uses a crisis narrative to emphasise the vulnerability of critical ecosystems - and their wetlands, rivers, fish, and birds - and argue that over-allocation of water to agricultural users has pushed these ecosystems to the brink. Fairness is considered a moral obligation to restore balance, with references to Australia's international commitments, such as the Ramsar Convention, and Aboriginal water rights. These submissions call for urgent, systemic reform, arguing that the current approach unfairly prioritises agricultural uses, threatening future generations and marginalised communities. Procedural fairness is also a key theme, with demands for appropriate representation for the environment in an overhaul of water-sharing policies to secure a sustainable future for all Australians.

3. **First Nations** submissions frame fairness through emphasising connection to Country, dispossession and restorative justice. Central to this is First Nations peoples' cultural and spiritual connection to Country, where water is a sacred and integral part of life. Fairness requires addressing the historical and ongoing dispossession of First Nations peoples from their lands and waters by restoring inherent water rights. Water reforms of recent decades represent a "double dispossession", compounding the losses caused by colonisation. Governments must address Aboriginal water rights in the Basin to meet their obligations under international agreements, such as the UN Declaration on the Rights of Indigenous Peoples and the Convention on Biological Diversity. However, this narrative frames fairness as not just a matter of legal rights but as a necessary step toward healing and restoring the health of both the environment and First Nations communities. Transferring water to First Nations ownership alongside incorporating Traditional Knowledge and First Nations peoples in water policy decision-making provides a pathway to justice and

sustainable water management.

4. **Regional** submissions present two distinct frames that emphasise the importance of local identity, knowledge, and wellbeing in water policy decisions for the Basin. Both frames emphasise the failure of urban policymakers from centralised government bureaucracies to understand the real-world impacts of water policy change on rural communities. The first frame has strong parallels with the Agricultural frame and highlights the social and economic harms inflicted on rural communities by water recovery targets. Water recovery is considered to be unfair and unjust because it disproportionately imposes concentrated burdens on rural communities to appease the ideological aspirations of city-dwellers who do not know about or live in the Basin. The second frame focuses on addressing ecological decline in the Basin and the corrupting influence of corporate interests on policy design and implementation. This frame has strong parallels with the Environmental frame and contrasts corporate (often international) interests with small, local farmers who are portrayed as stewards of the environment and the backbone of rural communities. Both frames argue that regional voices and local knowledge should be central to policy design, advocating for equitable outcomes that support the livelihoods and resilience of rural communities in the Basin.

Narrow frames

1. **Commercial, non-consumptive** submissions present a narrow, technical frame focused on water market operations and design. Stakeholders in this group largely support the market-based system but highlight specific areas for improvement, particularly concerning transparency, liquidity, and the role of non-user market participants like speculators. Keywords such as *opaque*, *liquidity*, and *bids* reflect targeted concerns about government interventions and infrastructure operator actions, which are seen to undermine market efficiency. Storylines also highlight issues of water scarcity, linking drivers of change in supply and demand dynamics, such as climate change and permanent plantings, to rising prices and market risks. Fairness is framed in terms of market rules, with stakeholders calling for greater transparency to address information asymmetries that disadvantage some participants. While concerns overlap with agricultural frames, the commercial, non-consumptive submissions focus more on practical reforms to rebuild trust and ensure fairer market outcomes.
2. **Resource managers** submissions employ a narrow frame centered on the operation of water utilities and infrastructure, with little engagement beyond these technical aspects. The majority of submissions, particularly those to the Productivity Commission inquiry into National Water Reform, focus on servicing customers, managing infrastructure, and responding to external events like the COVID-19 pandemic. Fairness concepts are rarely invoked, with the term "equitable" appearing solely in relation to service provision and Inter Valley Trade (IVT). These submissions reflect a utilitarian approach, prioritising efficiency and operational stability over broader social or environmental narratives.

Genre-dominated submission groups

1. **Elected representatives**' speeches in Federal Parliament reflect a wide range of views, corresponding to the diverse constituencies they represent. Fairness is a common theme, though it aligns with the specific concerns of different groups. Greens MPs often frame fairness in terms of returning water to the environment, critiquing excessive water use by certain sectors. In contrast, MPs from the National Party and some regional independents emphasise the unfair burdens placed on farmers and rural communities by water recovery targets, framing them as arbitrary and harmful. Other representatives focus on ensuring transparency and equity in water markets, addressing concerns about market concentration and regional inequalities. These speeches illustrate how parliamentary discourse parallels the advocacy frames found in water policy submissions, drawing on frames established by political actors with a strong interest in water policy outcomes.
2. **Government** submissions are characterised by a bureaucratic genre that emphasises policy development and implementation in abstract terms, often detached from the substantive issues raised by other stakeholders. The keywords and collocates used in these submissions, while consistent across different inquiries, could apply to nearly any policy domain. Fairness concepts, such as "equitable", appear infrequently and are used without substantive narrative development. Government submissions generally

focus on ensuring transparent, equitable water management for current and future generations but lack the detailed framing storylines found in other stakeholder groups.

3. **Research** submissions in water policy inquiries represent a distinct genre, shaped by academic language and disciplinary expectations. Unlike other groups, research submissions do not adopt a single overarching frame or represent a single perspective. While many research groups submissions align with frames used by other groups, such as the crisis narrative embedded in ecological research, the diversity of topics and perspectives included here confirms that our coding of research submissions has captured a genre rather than a single interest group. Topic modelling reveals that research submissions span a wide range of issues, addressing both ecological risks and technical market operations. Further analysis of individual submissions would be required to link individual submissions with particular frames.

Table 1: Summary of major elements and fairness characterisation for each group frame

Frame	Major elements	Fairness characterised as
Agricultural	Perceived imbalance between environmental and agricultural priorities; burdens on farmers from water recovery targets and market structures favouring corporations over family farms.	Equity in burden-sharing, protection of rural communities, and fair competition in water markets.
Environmental	Crisis narrative highlighting the vulnerability of ecosystems; demand for systemic reforms prioritising environmental needs and Aboriginal water rights.	Moral obligation to restore balance between human and environmental water uses, ecological justice themes, procedural fairness through greater environmental representation, and a focus on safeguarding the environment for future generations.
First Nations	Emphasis on connection to Country, dispossession, and calls for recognition of inherent water rights and incorporation of Traditional Knowledge.	Restorative justice focus, restoring water rights as part of healing, justice, and sustainable water management; meeting UNDRIP obligations.
Regional	Focus on local identity, knowledge, and wellbeing; critiques of urban policymakers lack of local understanding and engagement.	Empowerment of regional voices, equitable outcomes for rural communities, and addressing ecological decline.
Commercial non-consumptive	Technical focus on improving water market transparency, liquidity, and efficiency; concerns over market dynamics like climate change and permanent plantings.	Transparency and efficiency in market rules to address information asymmetries and build trust.
Resource managers	Narrow focus on operational efficiency of utilities and infrastructure, with minimal engagement in broader policy debates.	Efficiency and stability in service provision, with fairness addressed only in relation to customer service and trade.
Research	Academic, diverse topics often aligned with other frames but framed through disciplinary norms; topics range from ecological risks to market operations.	Aligned with broader fairness themes depending on research focus.
Government	Bureaucratic emphasis on transparent, equitable management; abstract and detached from substantive issues raised by other stakeholders.	Procedural fairness in ensuring long-term equity in resource distribution.
Elected representatives	Reflects diverse constituencies; focuses range from environmental restoration (Greens) to burdens on farmers and rural communities (National Party, independents).	Fairness framed according to political alignment, including environmental balance or burden-sharing for rural communities.

Topic modelling

To supplement our analysis and ensure the robustness of our findings, we conducted topic modelling to summarise the overall content of submissions, independent of their group assignments or sources. Topic mod-

elling provides a high-level overview, allowing topics to emerge inductively rather than being pre-assigned to stakeholder categories. This offers a complementary approach to understanding broad framing patterns in the data. It confirmed that the frames we identified were not solely the result of our group categorisations but reflected broader patterns across the submissions.

Figure 1 shows the distribution of explicit fairness terms across the identified topics (for a full topic word list see Table 15) and Figure 2 summarises the prevalence of each topic across our groupings. The relative weighting of fairness terms across topics is informative – 'justice" is almost exclusively associated with topic 23 addressing First Nations submissions, while "fair", "equity" and "equitable" are more broadly associated across many topics. Figure 2 shows strong associations between some topics and some groups of submitters. For example, topic 23 is strongly associated with First Nations submissions and topic 19 is strongly associated with the resource management group, while topic 2 is strongly associated with speeches in Federal Parliament, consistent with our interpretation of genre conventions dominating this topic.

Conclusions

Equity, fairness, and justice are highly contested, with their meanings shaped by the broader political context.

Fairness, equity, and justice are "essentially contested" concepts, open to multiple reasonable interpretations. Their emotional and political resonance makes them powerful tools for framing policy debates, especially in contentious areas like water policy. Despite ongoing disputes over their precise meanings, enough shared understanding exists for political actors to leverage these concepts within broader frames to shape policy decisions.

Our analysis shows that fairness is often applied through narratives crafted by political actors to advance particular agendas. These narratives selectively present facts, weaving them into storylines that justify specific policy outcomes. Storylines embed fairness debates within broader frames that define the issues, outline the role of government, and propose acceptable solutions.

For policymakers, understanding how different groups frame fairness is critical to navigating the complexities of contested debates like those surrounding water policy in the Murray-Darling Basin. Policymakers can also work to build mutual understanding between stakeholders by showing the different, and often equally legitimate ways, contentious policy debates can be framed. Mutual understanding is a key stepping stone to negotiating workable agreements across partisan divides.

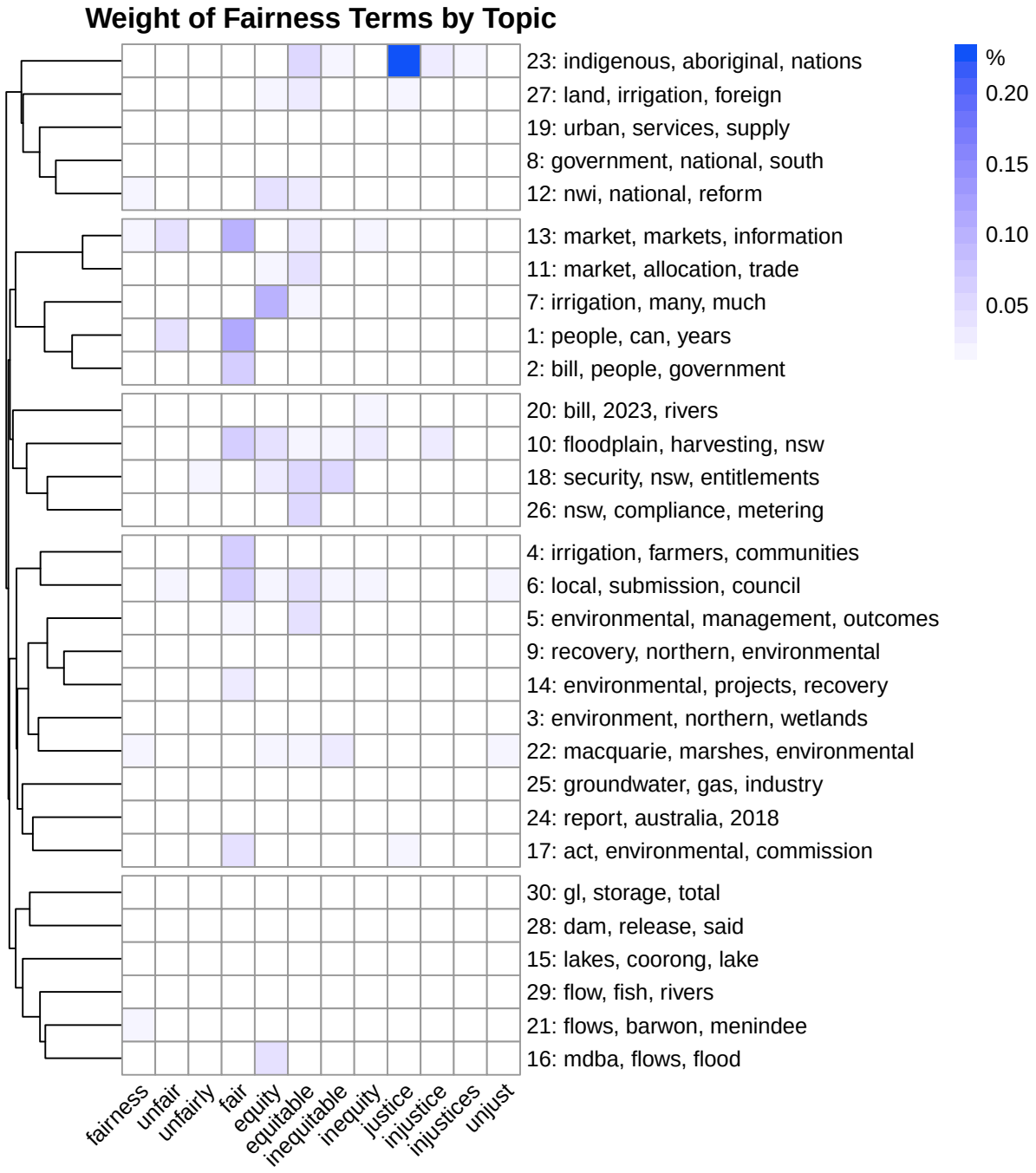

Figure 1: Weights assigned to equity, fairness and justice related words by topic. Although explicit use of these terms is rare, their usage is strongly associated with particular topics. The left hand side of the figure indicates the dendrogram resulting from a complete-linkage hierarchical clustering of the word representations for each topic. The five groups are derived from this hierarchical clustering and represent potentially related groupings of topics.

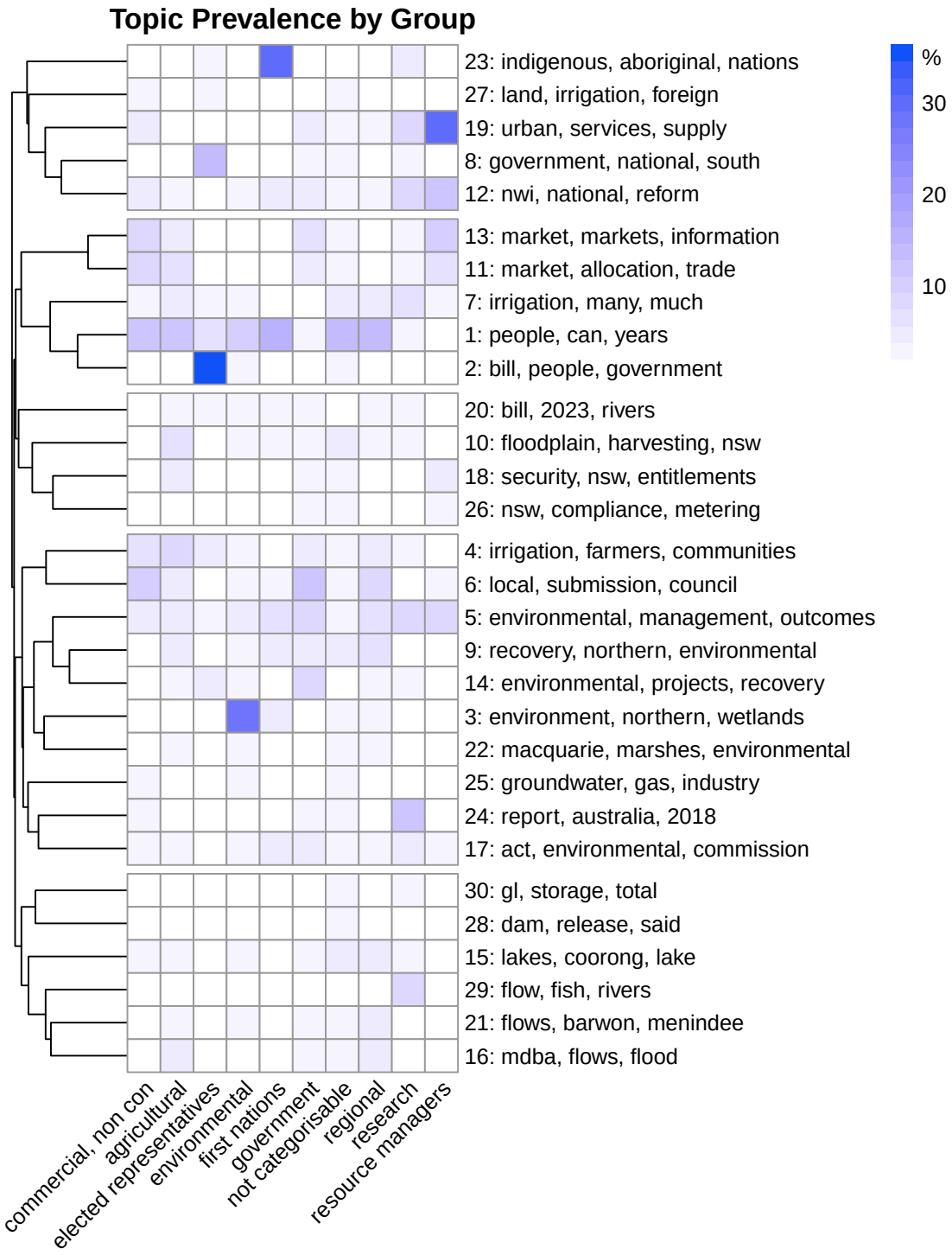

Figure 2: Average topic prevalence by group. Prevalence is the proportion of the content of that group estimated to come from that topic and is between 0 and 100%. The numbers in the topics are the rank order of topic prevalence as indicated in Table 15. The hierarchical dendrogram on the left is complete-linkage clustering of the topic-term weight vectors and the vertical groups are the same five as used earlier.

Overview

> The real political salience of water lies [...] in its ability to mobilise key actors either to promote collective action or to channel sectional discord. Shared water resources are a stage on which these deeply political dramas unfold.
>
> –Scott Moore[1]

The management and use of water in the Murray-Darling has been marked by conflict and an ongoing series of political settlements since well before Australia's Federation in 1901.[2] Cycles of conflict and cooperation over water management is not unusual for river basins within single nations that span more than one sub-national jurisdiction. The multiple interests in water, along with its intersections with a broad range of other policy issues, provide fertile ground for various political actors – including elected officials, local communities, industry groups, advocacy coalitions, and partisan interests – to influence "subnational hydropolitics" to support their desired outcomes.[1]

Harold Lasswell defined politics as "who gets what, when and how".[6] Politics is about the exercise of power and authority to impose preferences and determine distributional outcomes.[7,8] The winners of political contests in modern democratic states reshape public policies, laws and public institutions and deploy the coercive powers of the state in ways that reflect their preferences. Consequently, political actors focus on policy as both the terrain on which political conflict plays out and a prize capable of delivering the outcomes they seek.[7]

Framing issues is an important part of political contests.[9] Frames provide "a central organising idea or story line" that "establishes the terrain on which political struggle takes place".[10,11] Framing water policy issues has played a central role in the politics surrounding the management and use of water in the Murray-Darling Basin. Conceptions of equity, fairness and justice (we use "fairness concepts" for convenience in the following) play a role in framing political actors' policy demands around managing water in the Murray-Darling Basin (Basin). Claims a certain policy outcome or process is "unfair" have strong political salience. However, political actors do not advocate for equity, fairness, and justice as abstract ideals; rather, they tactically use these principles to rally support for their interests, enhance storylines associated with their preferred frame, and undermine or vilify groups with opposing views. This leads to fairness concepts remaining 'essentially contested' rather than debates that resolve their meaning to any agreed formulation.[12]

The political salience of fairness concepts is shown by their prevalence in Parliamentary debates, second-reading speeches, policy documents and legislation relating to water policy in the Basin. They are present in the water-related legislation in the Basin jurisdictions – our companion study *Water, law and concepts of equity*[13] found they are "ubiquitous across many areas of water-related legislation". However, despite the extent of references to equity concepts our study of water law also found,

> [t]he precise meaning of equity-related concepts rarely receives legislative or policy elaboration, and often remains unclear. The most detailed provisions relate to economic aspects of equity and those in which impacts and benefits are traditionally quantified.[13]

This finding is consistent with earlier work on the subject. A prominent study from the late 1990s found that:

> Government policies constantly state that resources will be allocated "equitably", yet the area that has received least attention is the *definition of what is "just", or "fair" or "equitable"* as seen by the ragne of stakeholders in water allocation decisions. [original emphasis][4]

Only limited work has been done to address this issue in the intervening decades (see our companion literature review).[5] While there has been a considerable amount of scholarship on water justice and similar themes that advocates for particular outcomes, there has been no overall examination of the different ways stakeholder groups understand and use the terms in political contests. To better understand how policy constituencies, advocacy coalitions, and citizens conceptualize fairness, this paper presents an exploratory analysis of over 1800 submissions made to seven public inquiries over the last 10 years, second-reading speeches for key Federal water legislation from 2007-2023, and five years of tweets from 2018-2023. The analysis draws on corpus linguistics tools to explore the language stakeholders use to frame water management issues in the political contest over how the authority of the state will be deployed to determine "who gets what, when and how." Importantly, the purpose of this study is not to assess or judge competing perspectives on what different groups see as equitable, fair, or just, but rather to systematically examine and map these perspectives. While normative debates about fairness are unavoidable in policy conflicts, this study focuses on understanding how fairness is framed and mobilized by different actors rather than evaluating the validity of any particular claim.

Fairness concepts

There is some debate about the different meanings of 'equity', 'fairness' and 'justice'. However, the dictionary definitions exhibit a notable circularity:

> *equity*: that which is fair and just (Macquarie Dictionary)
>
> *fair*: with justice or fairness; honestly, impartially; in accordance with what is right, honourable, or legitimate (OED)
>
> *just*: consonant with principles of moral right or of equity; righteous; equitable; fair (OED)

"Equity" is defined by "fairness" and "justice," "fair" is described in terms of "justice" and what is "right," while "just" is linked to "equity" and "fairness." This self-referential loop creates a challenge in understanding these concepts independently, as each relies on the others for its definition. We suggest this justifies a working assumption that in ordinary language use these terms function as a rough conceptual unit or shared shared semantic field, where they collectively express a broader idea of fairness or moral rightness in everyday discourse. A similar entanglement is found in John Rawls, *A theory of justice*, one of the twentieth century's most influential discussions of justice, which begins by noting that he will "present the main idea of justice as fairness".

Equity, fairness, justice – essentially contested concepts

Concepts like equity, fairness and justice are "essentially contested" because they are complex, value-laden, and open to multiple reasonable interpretations. These concepts are subject to ongoing disputes about their meaning and application.[12] Fairness concepts have strong emotional and political salience and are incorporated into the frames used by political actors in their attempts to reshape the policy terrain and influence government policy. While the meaning of essentially contested concepts is open, it is not arbitrary. There is some common ground or shared meaning that allows different uses and definitions to be contested and using an essentially contested concept means using it "against other uses and to recognise that one's own use of it has to be maintained against these other uses."[12]

We began this work with the premise that there would be different notions of fairness put forward by different stakeholder groups. Our analysis identified that the meaning of these concepts was to be found in the con-

text of the broader frames established by political actors to respond to and influence water policy as well as make sense of the wider world and how it works. Fairness concepts in these frames are far from abstract concepts. They are embedded within broader storylines that deal with the role and workings of government, the status of the natural world and our our relationship to it, and the kinds of knowledge that should be prioritised in addressing policy problems. All these elements constitute frames that argue for a particular distribution of the benefits and burdens of water policy.

The common ground across fairness concepts found in the various frames we have identified is "giving people what is due to them, and not giving them what is not due to them."[14] This idea extends to the natural world for almost all frames and the trade-offs and conflict come from significant differences in understanding what the various parties who experience benefits and burdens as a result of water policy have as their due. This idea is probably closest to what has been referred to as the "formal principle of distributive justice":[15,16]

> Equals should be treated equally, and unequals unequally, in proportion to relevant similarities and differences.*

The particular elements selected and made salient by the frames used by different groups provide the context needed to define equals and unequals and the characteristics relevant to any assessment of fairness. As H.L.A. Hart noted, the concept of justice is a

> shifting or varying criterion used in determining when, for any given purpose, cases are alike or different. In this respect justice is like the notions of what is genuine, or tall, or warm, which contain an implicit reference to a standard which varies with the classification of the thing to which they are applied."[19]

Hart's highlighting of the varying ways in which justice might be conceptualised is paralleled by his contemporary Isaiah Berlin, who reminds us, there is "no overarching standard or criterion... available to decide between, or reconcile... wholly opposed moralities."[20] Empirical research supports Hart and Berlin's views. Not only do people's perspectives of fairness vary between groups in ways that parallel the workings of "identity-protective cognition" – the mechanism by which people interpret information so as to ensure it aligns with and protects their group identity and values[21,22] – but in experimental games people's definitions of fair outcomes change with their material circumstances and the benefits available. Loss of social status increases support for redistributive government policy[23] and assessments of fairness can shift in minutes during experimental games depending on roles assigned to participants.[24] We are, as one philosopher puts it, "highly intelligent, vigilant, devious, self-deceiving, coalitional apes",[25] subject to "partisan motivated reasoning".[26] That is,

> whenever individuals are motivated to promote the interests of a coalition involved in intergroup conflict, they will be motivationally biased towards beliefs conducive to promoting and justifying their side's superior claim to power and status.[26]

Here we return to the importance of frames, which help package and selectively present reality in ways that help justify a set of policy conclusions favorable to the advocacy group concerned. In framing, actors engage with evidence to shape a storyline that highlights certain actors and elements of the context (the policy terrain) in support of a particular policy outcomes. Framing in this way rarely involves fabrication, instead framing is the selective presentation of facts, weaving them together in a convincing storyline that is"conducive to justifying the relevant party's superior claim to power and status over rival parties."[26] Consequently,

*This restating is from Buchanan and Mathieu's restating of Feinberg's original formulation:

> Our formal principle (which derives from Aristotle) would have us: (1) treat alike (equally) those who are the same (equal) in relevant respects, and (2) treat unalike (unequally) those who are unalike (unequal) in relevant respects, in direct proportion to the differences (inequalities) between them.

See discussion of the principle in other work.[17,18]

> group allegiances determine apparent moral values more than the other way around, ethical philosophies are often confabulated to justify support for one's allies, and moral "principles" change flexibly depending on whether they benefit one's allies or rivals [...] Rather than disagreeing about the general moral importance of tolerance, authority, or equality, partisans may merely disagree about who should be tolerated, whose authority is legitimate, and whose advantages are unfair. Rather than disagreeing about justice in the abstract, partisans may merely disagree about who deserves status (and how much), who deserves condemnation (and how much), and who deserves sympathy (and how much). Indeed, much of political discourse plays out against a backdrop of tacit moral agreement. Disputants compete to frame their opponents as immoral—e.g., unfair, selfish, disrespectful—while relying on shared assumptions of what counts as moral.[27]

We found that the most useful way to understand fairness concepts across the submissions analysed was in the context of the broader frames used by political actors – individuals or groups seeking to influence policy or shift the terrain on which contests about water policy in the Basin occur. This approach is consistent with the considerable body of work across multiple academic traditions discussed below demonstrating the links between language, framing, narratives and storylines and political contests over policy.[28–32] Underlying all of these approaches is a basic assumption that "language profoundly shapes one's view of the world and reality, instead of being only a neutral medium mirroring it."[28]

Policy as terrain and prize

What is policy?

We adopt Paul Cairney's definition of policy as "the sum total of government action, from signals of intent to the final outcomes."[33]

Public policies and the legal and institutional frameworks put in place to support and implement them are not just the end results of political contests. Policy regimes shape and structure the "terrain" on which political battles are fought and this has significant consequences for agenda setting through to policy implementation. Policy regimes set the rules of the terrain, determining what the major issues are; how they are best prioritised and resolved; who participates in their resolution, in what circumstances and subject to what constraints; how resources are distributed across different interest groups, which changes their political influence; and what forms of knowledge are legitimate inputs.[7,34] The terrain is not neutral; it favors certain actors and outcomes over others, making it a crucial element in understanding the dynamics of political power. Shaping the policy terrain also includes what government will not do – policy is about power and this includes keeping issues off the agenda.[33] Political actors, particularly organised interests, work to reshape the policy terrain in their favour. Consequently, politics not only create policy; "policies make politics".[35]

> To employ an ecological metaphor, policy regimes create political "ecosystems" that allow some actors and activities to flourish while others wither. In the long run, therefore, policies are not simply outputs of a given polity. They can have a strong influence on the composition of the polity itself.[7]

The importance of policy regimes in establishing the terrain on which policy contests take place means that changing (or maintaining) them represents a significant "prize" for political actors. Policy regimes can confer significant benefits or impose substantial costs. This makes policies the central objects of political competition. Political actors – especially organised interest groups – are highly motivated to influence policy because of the material and institutional advantages that a favourable policy regime can bring to a particular set of interests. Organised interests are particularly focused on influencing policy regimes because they

represent durable outcomes that are likely to be maintained for periods much longer than the electoral cycle.[7] For example, the *Water Act 2007* and the *Basin Plan 2012* represent a policy regime with legal, regulatory and institutional structures that embed a particular way of managing water in the Basin that prioritises environmental outcomes. The environment is at the core of this current policy regime (see s3 of the *Water Act*) in a way it was not for the majority of the twentieth century where investment in infrastructure and irrigation schemes for closer settlement, economic development and regional employment were prioritised.[2,36,37] We see this shift in policy regime in the language used by all groups in the submissions analysed below.

The framing contest

Political actors frame policy issues in ways favorable to their interests as they attempt to shape the policy terrain on which political contests occur. The European Commission recently emphasised the importance of policymakers understanding how framing, narrative and metaphor shape the politics surrounding important policy decisions.

> Framing, metaphor and narrative: facts don't speak for themselves. [...] There is no such thing as a neutral frame; something is included at the expense of something else. The ways in which policy problems are framed can substantially influence beliefs. It is not the side with the most or best facts that wins an argument, but the one that provides the most plausible scenario that feels intuitively reliable, communicated by a perceived credible source.[38]

A frame is "a central organising idea or story line that provides meaning to an unfolding strip of events, weaving a connection among them. The frame suggests what the controversy is about, the essence of the issue."[10] Framing can often be strategic, but sometimes it is bound up with groups shared worldviews.[9,30,39] The political discourse surrounding a set of related policy issues usually contains multiple, conflicting frames participating in "framing contests", with competition for which narrative frame will dominate public and policymakers' understanding of policy issues and shape the terrain on which policy battles are fought.[11,29,4029] The policy terrain is also a narrative terrain and the policy prize is as much about dominating the narrative (or 'discursive hegemony') as it is about securing specific policy outcomes.[28]

Framing involves constructing these storylines through *selection* and *salience*, often using a specific vocabulary, so as to:

> select some aspects of a perceived reality and make them more salient [...] in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described.[30]

Frames provide heuristics that help structure advocacy coalitions' worldviews and shape the features of their participation in policy debates. They help make meaning of the physical and social worlds people inhabit.[28] They bind together members of advocacy coalitions who share belief systems framed by narratives that structure their understanding of policy issues, key actors, relevant information and preferred policy outcomes.[31,39,41] Frames' storylines define problems, diagnose causes, make moral judgements and suggest remedies.[30,39] The success of a narrative frame is usually bound to its "narrative fidelity", that is its ability to resonate with broader cultural narratives, commonly used metaphors and stories.[42]

Fairness concepts play an important role in broader framing contests around water policy because of their political and psychological salience. They provide a heuristic with deep emotional resonance that can stand in for more comprehensive analysis of specific policies. Such heuristics are useful in the framing contests that seek to shift the policy terrain in a particular direction or to build a stronger advocacy coalition behind a preferred set of policy outcomes. Considerable scholarship supports the importance of fairness heuristics in human decision-making and the appraisal of political outcomes.[18,43,44] It is likely these heuristics have an evolutionary origin and we appear to share them with other primates.[45–47] Their political importance arises because

> once an impression of fairness has been produced it becomes extremely resistant to change [...] because it provides a cognitively available summary judgement. People use their summary fairness judgement in lieu of a more complicated analysis of policy each time they are asked.[48]

Corpus-assisted frame analysis

Corpus linguistics is "the study of language based on examples of real life language use".[49] It uses computational techniques to analyse *corpora* – large collections of natural language data – to find patterns of word usage and distribution that contribute to our understanding of how language is used to communicate meaning and construct world views.[50]

A long-standing criticism of most forms of "discourse", "frame" and "narrative" analyses is the dependence of these approaches on qualitative analysis and corresponding lack of rigour, potential for selection bias from the close reading of a limited number of texts, and lack of a systematic method.[50] The biases of the analyst influence qualitative discourse analysis so that "[y]our analysis will be the record of whatever partial interpretation suits your own agenda". In contrast, corpus linguistics approaches that "focus specific lexical items, describe their occurrence, and then infer what significance this might have" ground their interpretation in "systematic linguistic description" and avoid the pitfalls of using description as an "interpretive tactic".[51] Cross-pollination between the methodologies of corpus linguistics methodologies and discourse analysis provides a way of systematising and improving on the qualitative limitations of standard discourse analysis.[50,52] This paper uses corpus linguistic tools to explore the competing frames used by interest groups, advocacy coalitions and citizens as they seek to diagnose policy problems and influence government priorities and the policy agenda.

We used two complementary approaches to analyse frames across over 1800 submissions to inquiries into Basin water policy and relevant Hansard speeches to Federal Parliament. The first approach classified submissions based on the background of their authors, identifying 10 groups including environmental organisations, Indigenous groups and organisations, agricultural interests, government entities, and researchers. This actor-centric approach assumed that the identity and context of the authors influence the frames they deploy in their submissions. The second approach used Latent Dirichlet Allocation (LDA) topic modelling to uncover latent topics across the entire corpus of submissions without reference to stakeholder identities. This frame-centric method sought to identify recurring themes, or "topics," within the text itself, providing an alternative lens through which to understand the frames shaping discourses of water policy in the Basin.

In our first approach, we used keyword and collocation analysis to analyse the frames used by a range of different groups in public inquiry submissions, second-reading speeches and tweets related to water management in the MBasin. For our second approach, we used Latent Dirichlet Allocation (LDA) topic modelling. Each of these approaches is described below.

- **Keyword analysis** focused on identifying high-frequency words used by different groups in their responses to Basin water policy. Keywords construct frames by selecting "some aspects of a perceived reality and mak[ing] them more salient".[30] Identifying differences in sets of keywords between groups provides a systematic way of identifying different frames and uncovering different storylines with their particular problem definitions, causal interpretations, moral evaluations and policy preferences.[30]
- **Collocation analysis** looks at words collocated with keywords for each group on the understanding that "words occur in characteristic collocations, which show the associations and connotations they have, and therefore the assumptions they embody."[53,54] While keywords provide the focus, collocation analysis provides a systematic approach to understanding other elements that make up the storyline of each frame. Collocated words also help distinguish between frames as in the example below.
- **Topic modelling** uncovers latent patterns in text by identifying clusters of co-occurring words. Using Latent Dirichlet Allocation (LDA),[55] we analysed the submissions as a single corpus, allowing topics to emerge inductively rather than being pre-assigned to stakeholder groups. It excels at analysing large corpora systematically, offering a high-level overview of thematic structures. While useful for uncovering latent

frames not apparent through actor-centric methods, it can obscure contextual nuances by not linking topics to specific actors' goals. Paired with actor-centric approaches, topic modelling provides a complementary perspective on framing dynamics in water policy discourse in the Basin.

Further detail on the rationale for this approach and other lines of inquiry we did not pursue can be found in the Methodology section at page 77 below.

The basis for this work was to examine how notions of equity, fairness and justice (for the sake of space we will use fairness as the umbrella term for these concepts from here on) were used in these submissions to public inquiries. We started this work with the premise that there would be different notions of fairness put forward by different stakeholder groups and that these different understandings of what is fair would contribute to explaining why water policy is so contested in Australia. Understanding these differences could lead to more implementable water policy directions by....

This report outlines our exploratory analysis, starting from this premise of identifying and understanding different notions of fairness, and follows it through to a more complicated understanding of how different stakeholder groups engage with public inquiries through their submissions. Ultimately, rather than investigating the specific framing of fairness alone, we draw on the tools of corpus linguistics to analyse how different stakeholder groups use and highlight different issues in their submissions and how these overarching frames influence the meaning of fairness and the use of fairness in framing contests over water policy in the Basin.

Results and Discussion

Summary of Included Submissions by Groups

The analysis included inquiries and other data sources as shown with the breakdown of identified stakeholder groups in Table 2. For detail on the identification of groups and the classification of submissions see the Identifying Stakeholder Groups section in the Methodology chapter below.

Table 2: Count of submissions and speeches for each data source, broken down by inferred stakeholder groups.

Inquiry	commercialnon	agriculture	environmental	firstnations	government	notcategorisable	regional	research	resourcemanagers	electedrep	Total
Inquiry into the Water Amendment (Restoring our Rivers) Bill 2023	5	52	19	5	24	3	10	7	-	-	**125**
Murray Darling Basin Authority Basin Plan Amendments 2017	15	83	264	20	21	40	54	3	1	-	**501**
Murray-Darling Basin Water Markets Inquiry 2019-21 †	26	105	8	2	21	26	9	10	7	-	**214**
NSW Select Committee on Floodplain Harvesting 2021	2	71	86	6	13	81	20	4	1	-	**284**
Productivity Commission National Water Reform 2020 †	22	36	30	12	23	8	14	28	21	-	**194**
SA Murray-Darling Basin Royal Commission 2018	9	40	29	4	18	23	21	13	1	-	**158**
Select Committee on the Murray-Darling Basin Plan 2015	33	206	41	2	30	27	53	5	2	-	**399**
Speeches from Federal Parliament	-	-	-	-	-	-	-	-	-	396	**396**
Total	112	593	477	51	150	208	181	70	33	396	**2271**

† The Productivity Commission National Water Reform 2020 and the Murray-Darling Basin Water Markets Inquiry 2019-2021 include both initial and post-draft submissions.

There is substantial variation in engagement by different stakeholder groups across the inquiries. Most inquiries receive substantial engagement from one or more groups and minimal engagement from others. Looking at any single inquiry would therefore be examining only part of the overall picture. The only stakeholder group that consistently engaged with all inquiries was the government group. For all other groups, more than half of the submissions for that group were either to a single inquiry (environmental and resource manager groups),* or to two main inquiries (all other groups).

The uneven distribution of stakeholder engagement can be a product of both the terms of references of the

*Note the discussion below on the use of campaign submissions, which inflate the total number of submissions received.

inquiry (resource managers primarily responding to the Productivity Commission National Water Reform Inquiry), or a product of engagement and activism to encourage submissions to particular inquiries. This is clear for the 264 environmental submissions to the Murray Darling Basin Authority Basin Plan Amendments Inquiry which will be discussed in further detail in the Environmental section below, and the 81 submissions that were not otherwise categorisable to the NSW Select Committee on Floodplain Harvesting in 2021. The latter submissions can be partially attributed to an Australian YouTuber's release of a documentary on water markets[56]. The pinned comment (prominently displayed below the video) directed viewers to the submissions page for that inquiry, resulting in a number of short but emotive submissions to the inquiry.

In addition to the different constructions of documents for submission noted in the Submissions to Public Inquiries section, we also note briefly the wide variety of genres and content observed in the submissions. Some of the genres observed during the format annotation process included:

- Handwritten notes including personal reminiscences.
- Photo-essays describing local conditions along the river.
- Technical reports on detailed aspects of water management.
- An appendix of newspaper clippings relevant to the submission.
- Academic submissions including formal citation practices.

Taking into account that none of the inquiries placed any major restrictions on the format or length of submissions (typically the only limit was document size), submissions differed wildly in form from a single sentence to 50 page technical reports including charts, graphs, and tables provided in a professionally typeset document design. Submissions made on behalf of organisations were typically highly produced, and where a single organisation made submissions to many inquiries there was often duplication in form, structure, and content of submissions made across these different inquiries.

Group Topics and Similarities

We sought to understand how similar or different the language used by each stakeholder group was from the other groups in general terms. Alongside our 4.5topic modelling work, we used cosine similarity analysis to quantify the linguistic overlap between the groups in a pairwise fashion. This method allows us to measure the degree to which stakeholders use similar or divergent language in their submissions, offering a deeper insight into how various actors engage with and interpret key policy issues. While this analysis does not specify the frames used by submissions in each group, it provides a useful indication of the similarities and differences between the lexical patterns used by the various groups. We also examined the most frequent words used by each group and the distribution of these words across all groups. This frequency analysis reveals the extent to which the environmental focus of the *Water Act* has shaped the policy terrain.

Cosine similarity

Cosine similarity is a method used to measure the similarity between texts by converting them into numerical vectors. In this case, we have combined all the tokenised* submissions from each stakeholder group and transformed each into a single vector that represents the "average" submission for that group. Each dimension of the vector represents a unique word, and the value in that dimension reflects the frequency or importance of the word in the total set using normalised term frequency-inverse document frequency (TF-IDF) as weighting - the inverse document frequency weighting ensures that rarer terms receive proportionally more weight, and common terms (for example - water) receive relatively little weight.

*In computational corpus linguistics, tokenise means to segment text into discrete units (tokens), such as words, phrases, or symbols, for linguistic or statistical analysis. It is a key preprocessing step in natural language processing (NLP).

Once the text is converted into vectors, cosine similarity calculates the pairwise cosine of the angle between vectors. If two groups of submissions use similar language or terms, their vectors will be closer together, leading to a cosine similarity value near 1. If they differ significantly in the words used, the angle between the vectors increases, and the similarity score approaches 0. Building on our discussion above, we could understand similarity scores as providing a measure of the similarity of the lexical "terrain" created by the framing used by each stakeholder group. It is important to recognise that high scores do not indicate semantic agreement. Groups could have totally opposed views but they are occupying a similar lexical terrain. Low cosine scores indicate that the lexical terrain is quite are different.

The heat map at Figure 3 shows the results of this analysis. The pairwise similarity between groups like "government", "regional" and "agricultural" (as indicated by darker red) shows they occupy similar policy terrains and used similar language or addressed common themes in their submissions. On the other hand, groups like "resource managers" and "environmental" show lower similarity, highlighting differences in how they framed water policy issues. This allows for a clear visualisation of the overlap and divergence across the framings used by the groups of submissions.

The cosine similarity heat map includes a dendrogram, which represents the results using a tree-like structure resulting from the hierarchical clustering completed as part of the analysis. Groups that are closer together on the dendrogram (i.e. their branches merge at a lower height) are more similar in their choice and proportion of word usage as measured by cosine distance. Groups that merge higher up in the tree are more distant from each other in their choice and proportion of word usage. For example, in the dendrogram, groups like "government," "regional," and "agricultural" are clustered together around short branches, indicating that submissions from these groups are closely related in terms of content. In contrast, "first nations" and "environmental" are connected to the others by longer branches, suggesting greater divergence from the other groups.

Frequency analysis

Table 3 shows the results of our simple groupwise word frequency analysis, which counts the number of times each word is used across each group, after removing stopwords and some genre words. We present the top twenty most frequent words for each group. Unsurprisingly, "water" is present for all groups. However, it is notable that "environmental" is present in the top 20 most frequent words for all groups with the exception of the resource managers and is the third most frequent word used across all groups. "Environmental" as an adjective is paired with a variety of nouns including "water" and "flow", while "environment" is used less frequently and only in the top 20 words for three groups. However, the frequent presence of "environmental" across almost all groups provides evidence to support the contention that the environment is now at the core of the current policy regime as discussed in Policy as terrain and prize above. It is a high-frequency word shared across more groups than "plan", "management", "government" or "river".

Table 4 shows the frequency of the top 20 most frequently used words across all groups. This table helps illustrate how our groups diverge. Once past the 10 most frequent words, words are only shared by half our groups' top 20 words. Past the 20 most frequent words, words are shared by only three groups and there is a long tail of words only used in the top twenty by one or two groups. This long tail includes words of high importance for some groups including "aboriginal", "cultural", "fish", "community" and "irrigators".

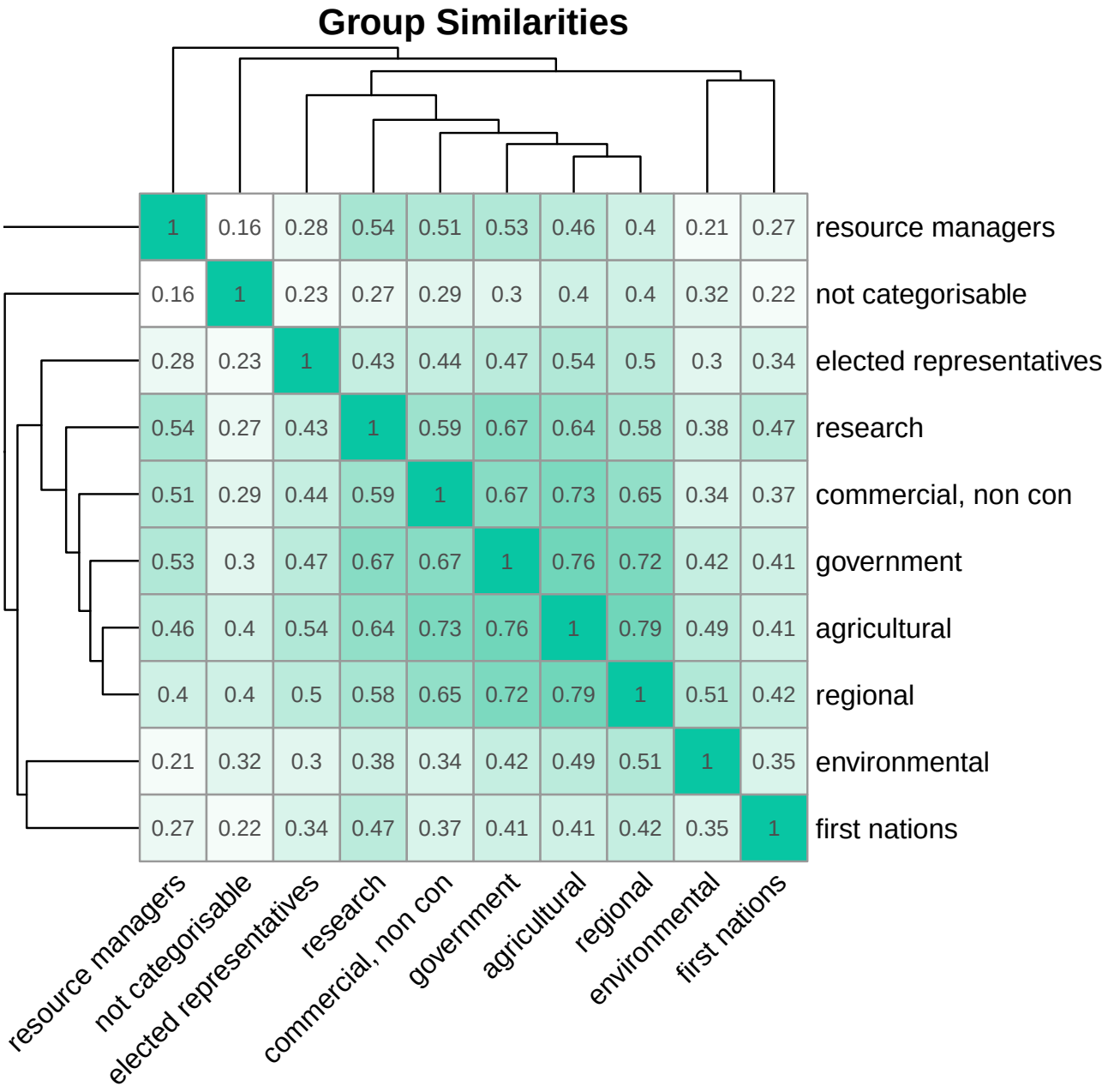

Figure 3: Cosine similarities between the average word usage vectors of each group. Scores closer to 1.0 indicate more similar groups (a group is always perfectly similar to itself, as along the diagonal). The upper and left edges of the heatmap are annotated with a dendrogram indicating the results of the complete-linkage hierarchical clustering of groups using the cosine distance.

Table 3: Top twenty most frequent words for each group (after removing stopwords and genre words). Tied scores are broken randomly.

rank	commercial, non	agricultural	electedrep	environmental	First Nations	government	not categorisable	regional	research	resource managers
1	water	water	water	water	water	water	water	water	water	water
2	market	plan	murray	environmental	aboriginal	plan	river	murray	murray	urban
3	environmental	murray	plan	river	indigenous	environmental	murray	plan	river	market
4	murray	environmental	government	plan	people	murray	plan	environmental	environmental	management
5	markets	river	river	murray	cultural	nsw	environmental	river	management	national
6	irrigation	market	south	flows	nations	management	lakes	communities	australia	nwi
7	management	nsw	communities	environment	rights	river	australia	government	flow	planning
8	australia	irrigation	people	northern	first	market	government	nsw	plan	services
9	plan	management	australia	management	management	government	drought	management	flows	information
10	national	government	environmental	nsw	environmental	outcomes	south	local	report	outcomes
11	information	use	can	gl	land	communities	can	economic	floodplain	can
12	trade	can	system	system	communities	information	nsw	flows	rivers	communities
13	can	communities	national	floodplain	river	also	time	community	australian	community
14	use	also	time	flow	government	mdba	system	system	research	industry
15	australian	mdba	environment	use	traditional	act	years	mdba	fish	supply
16	also	flows	also	rivers	plan	trade	flows	environment	national	infrastructure
17	government	economic	one	australia	murray	economic	australian	can	also	nsw
18	report	system	need	communities	northern	can	one	irrigation	use	new
19	economic	irrigators	years	government	act	use	irrigation	regional	can	including
20	trading	australia	gigalitres	can	including	recovery	flow	lakes	irrigation	utilities

Table 4: Count of the number of groups for which each word occurs in the top 20 most frequent words. The maximum is 10, indicating that word was in the top 20 for all groups of submissions.

Word	Groups in Top 20	Word	Groups in Top 20
water	10	rivers	2
can	9	south	2
environmental	9	time	2
murray	9	trade	2
plan	9	years	2
government	8	aboriginal	1
management	8	cultural	1
river	8	drought	1
communities	7	first	1
australia	6	fish	1
nsw	6	gigalitres	1
also	5	gl	1
flows	5	indigenous	1
irrigation	5	industry	1
system	5	infrastructure	1
use	5	irrigators	1
economic	4	land	1
market	4	local	1
national	4	markets	1
australian	3	nations	1
environment	3	need	1
flow	3	new	1
information	3	nwi	1
mdba	3	planning	1
act	2	recovery	1
community	2	regional	1
floodplain	2	research	1
including	2	rights	1
lakes	2	services	1
northern	2	supply	1
one	2	trading	1
outcomes	2	traditional	1
people	2	urban	1
report	2	utilities	1

Topics by group

The prevalence of different topics across the identified groups are indicated in Figure 4. Consistent with the interpretation in Topic modelling results, we see that there is a strong association between some topics and some groups of submitters. Topic 23 is strongly associated with First Nations submissions, while topic 2 is strongly associated with speeches in Federal Parliament, consistent with our interpretation of the topic as indicating genre rather than content. Topic 19 is strongly associated with the resource management group and topic 24 is associated with research submissions as expected.

Examination of topics 5, 9, 14 and 3 shows the different approaches to submissions focusing on "the environment" and features of the environment compared to management and recovery of the water for the environment under the Murray Darling Basin Plan. Topic 3 is strongly associated with the environmental submissions and aligns with the high number of submissions responding to the terms of reference of the MDBA Basin Plan Amendments Inquiry. Unlike the focus of topic 3 in environmental submissions, topic 5 focusing on environmental management and outcomes is spread across many groups of submissions. See Figure 4 for further detail.

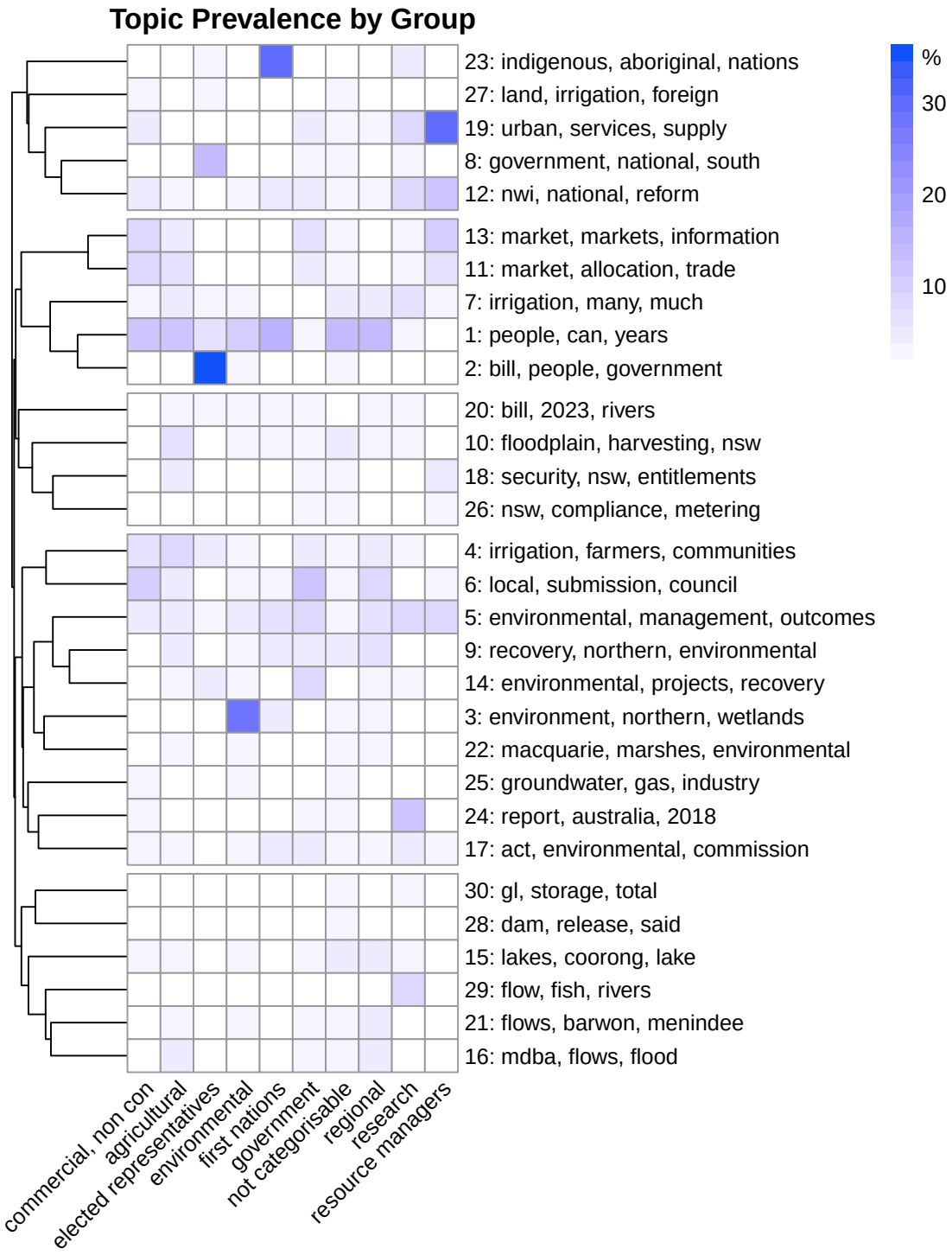

Figure 4: Average topic prevalence by group. Prevalence is the proportion of the content of that group estimated to come from that topic and is between 0 and 100%. The numbers in the topics are the rank order of topic prevalence as indicated in Table 15. The hierarchical dendrogram on the left is complete-linkage clustering of the topic-term weight vectors and the vertical groups are the same five as used earlier.

Differences Between Groups

We turn to examining the differences between groups by identifying keywords distinctive to each group. This is shown in Table 5, which outlines the distinctive words used by each group compared to all other groups according to the chi-squared statistic. Note that these keywords identify the words that are most distinctive for each group compared to all other groups combined. A keyword for one group does not indicate that other groups do not engage with the same topics in their submissions. The keywords identified also do not describe the totality of the submissions from each group. There may be other important factors that are not represented by the keywords. In particular, a hypothetical issue used uniformly by all submissions would not be rated as a keyword for any particular group. A further limitation of this analysis is that it does not fully account for the different sizes of groups. Because we compare one group against all other groups, groups with fewer submissions become harder to statistically distinguish using the significance testing measure we are using here.

We use a subset of these key words combined with a close reading of concordances and individual submissions to inform our analysis of the frames used by each group in the Understanding framing practices across stakeholder groups section below looking at the choices made to select and make salient certain elements important to water policy and managed in the Basin.

Table 5: Keywords ranked by the chi-squared measure for each stakeholder group compared to all other stakeholder groups, after removing some genre related keywords. Tied scores are broken randomly.

government	notcategorisable	environmental	agriculture	commercialnon	resourcemanagers	research	regional	firstnations	electedrep
council's	foreign	415	farm	liquidity	iwm	journal	mda	nban	gigalitres
2601	harvesting	marshes	family	clients	customers	temporal	region's	dispossession	cent
shire's	expectancy	ecosystems	temporary	transact	customer	continental	councils	undrip	got
council	tank	landscapes	irrigator	intermediary	liveable	colloff	referenced	sacred	know
marsden	water	macquarie	supplementary	awba	liveability	reid	resident	spiritual	mr
state's	ice	species	ml	earned	seq	researchers	lived	peoples	get
jacob	tion	gwydir	mdbp	counterparty	npr	wittwer	mdba	elders	course
website	stored	placing	irrigated	client	utilities	ward	stemming	culturally	bit
undertakes	fatal	floodplains	valleys	incentivised	sewerage	sensing	interagency	jackson	actually
accordance	honestly	vulnerable	nswic	broker	cooling	grafton	jo	mldrin	going
typically	engineer	additionally	holders	participant	recycled	landsat	km2	aboriginal	really
undergone	motor	cultural	peak	registers	retailer	recognizing	town	customary	lot
liability	helen	proposal	harvester	margins	pricing	thoms	hill	hartwig	howard
sewerage	dwindling	barwon	farmer	contract	wastewater	baselines	matthews	distinctive	heard
transformational	max	wetlands	season	transactions	sewage	campbell	lake	kon	absolutely
compact	piped	stress	carryover	intermediaries	greening	nicol	alexandrina	traditions	moment
feedback	men	fish	wakool	exchanges	affordability	lester	murraylands	culture	stand
02	gundagai	returned	valley	transaction	integration	41	corollary	declaration	quite
communication	anthony	opposed	traders	agents	potable	stressors	stats	osborne	pm
undertaken	install	values	barley	provider	stormwater	ye	tourism	hunting	thing
assurance	boat	gl	growers	tradition	wsaa	rogers	albert	colonisation	spoken
committed	1903	accept	excess	horizons	depreciation	marshall	390gl	continuities	nationals
coordination	clay	protect	commodities	ivt	cater	decentralised	wellbeing	lana	getting
focussed	cobar	least	450gl	opaque	frontier	conceptual	nebine	traditional	comes
cewo	effecting	please	farming	buyer	alignment	scales	yabbies	injustices	everybody
coordinated	cell	reduction	dairy	trades	bulk	mortality	routine	customs	remember
communications	transported	northern	farms	contractor	treatment	hancock	installations	title	rudd
outlines	corruption	reduce	expertly	agri	covid	leslie	region	colonial	put
wodonga	shore	flows	mil	consolidation	operator	bodied	accomplished	lands	go
options	algae	review	acres	bids	focussing	connor	harbor	neoliberal	ago
translates	ingress	negative	select	services	outfall	biology	locks	identity	hear
underway	illegal	amount	entitlement	buyers	regulators	biota	thriving	consent	us
implementing	thirst	environment	livestock	davidson	circular	sinclair	towns	empowering	colleagues
cc	fu	impacts	speculators	facilities	entrants	bond	lga	dispossessed	gigalitre
collaborative	ride	less	pasture	possibilities	certification	87	knock	ancestors	piece
email	immoral	due	choke	smdb	affordable	australasian	coorong	medicine	wong
effectiveness	iron	significant	landholder	professionals	frameworks	215	greedy	spirits	shadow
differ	documentary	water	district	utilities	organisational	194	border	nullius	interjecting
faehrmann	tip	important	planted	sophistication	benchmarking	porter	entire	heritage	pretty
publication	th	migratory	permanent	scarcity	amenity	steinfeld	equitable	indigenous	side
published	stop	available	charges	profession	providers	robertson	wentworth	teach	labor's
performance	plain	many	representing	participants	congestion	williams	pipeline	people's	says
outlooks	editor	needs	enabled	investors	cycle	organisms	local	nations	overallocation
office	sec	murray	650gl	profit	pandemic	170	website	justice	look
undertook	mum	ramsar	feral	distinct	beneficiaries	references	advisory	occupied	2,750
framework	plane	need	nff	indemnity	evolving	o'donnell	revegetation	workshop	debating
enclosed	canal	wildlife	cattle	methodologies	operates	linear	menindee	beneficially	1,500
plausible	proofing	ecological	cereals	broking	supplying	pittock	320gl	nari	450
benchmark	vote	birds	reliability	transfers	urban	terrestrial	eastern	foods	great
invitation	pockets	floodplain	production	eventually	literacy	concepts	plain	intangible	spoke

Sensitivity Analysis of Keyword Ranking

The sensitivity analysis, by excluding one group at a time, showed that rankings were mostly stable. As expected, rankings were only substantially different for groups where submissions from that group were focused in one or two inquiries. The most significant example of this ranking change is shown in table 6 for the environmental group, comparing the keywords from all submissions to the keywords generated as if we had not included a particular inquiry. Leaving out the 264 submissions from the MDBA Basin Plan Amendments inquiry results in a different set of top keywords. However, even here, while the top level 415 [GL] keyword is no longer present (an attribute that was part of the terms of reference for that particular inquiry) and there are some changes, the keywords remain broadly aligned with the environmental stakeholder group.

Table 6: The first column is the set of keywords generated from all environmental submissions, the second colum the set of keywords for environmental submissions after excluding all submissions to the MDBA Basin Plan Amendments Inquiry

Top Keywords From All Inquiries	Top Keywords From All Inquiries Except the MDBA BPA
415	ecosystems
marshes	harvesting
ecosystems	floodplain
landscapes	ecological
macquarie	corruption
species	algal
gwydir	blooms
placing	ecosystem
floodplains	theft
vulnerable	ramsar

This sensitivity analysis suggests that our included set of inquiries has been sufficient to capture examples from all stakeholder groups. We do not anticipate that adding submissions from more inquiries would lead to anything other than incremental changes from this set of submissions. This also highlights the importance of our approach to examine a selection of inquiries. A single inquiry would never have been able to capture submissions from all stakeholder groups.

Understanding framing practices across stakeholder groups

Framing involves storylines built around choices to select and make more salient certain aspects of the world. This section provides an overview of the results of our corpus-assisted frame analysis of submissions from our identified stakeholder groups. The analysis reveals three broad groups, which are outlined in Table 7.

.

Table 7: Frame types

Type	Description	Group
Broad frames	feature detailed storylines, embedded in clear worldviews, aimed at reshaping the policy landscape and engaging in framing contests over water management	agricultural, environmental, First Nations and regional groups
Narrow frames	aim to improve or comment on aspects of existing policy, they do not seek to change the policy terrain or clearly articulate a world view	commercial non-consumptive and resource management groups
Institutional genres	do not articulate clear frames at the group level; individual documents us frames (often aligned with the broad frame groups above) but language is dominated by institutional norms	research, government and electedrep groups

Frames, genres and shaping the policy terrain

Revisiting the cosine similarity analysis helps make the distinction between frames and genres and how stakeholder groups use frames to shape the policy terrain described in the section on Policy as terrain and prize above.[30] Taking the hierarchical clustering dendrogram from Figure 3 we can see how all submissions from each group cluster using the cosine similarity measure at Figure 5.

The dendrogram at Figure 5 reveals distinct patterns of framing and genre use. The four groups – firstnations, environmental, regional, and agricultural – that provide broad frames are central to a framing contest, each seeking to reshape the policy terrain towards their worldviews and prefered policy regime. However, firstnations and environmental groups are notably distinct from the other two in terms of cosine similarity, indicating that the lexical patterns in their framing strategies diverge. These two groups advocate for transformative changes based on justice, sustainability, and Indigenous rights, pushing their discourse well outside the bounds of the lexical patterns found in the cluster of submissions including elected representatives, research, commercial non-consumptive, government, agricultural and regional.

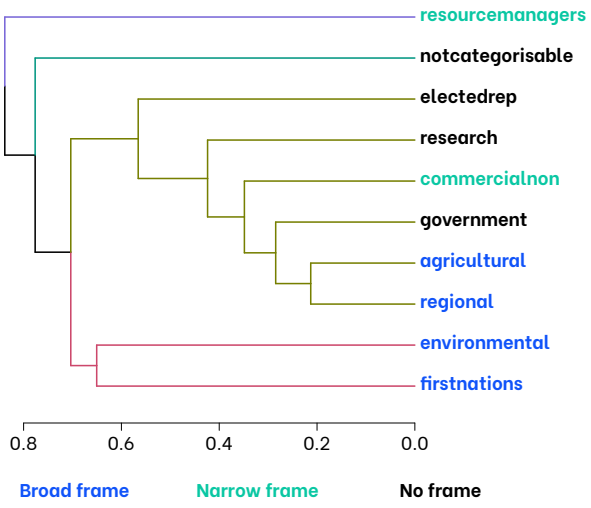

Figure 5: Dendrogram from hierarchical clustering of cosine similarities between groups.

The regional and agricultural groups, though also engaged in this framing contest, appear much closer to the government group in the dendrogram. This suggests that, despite pushing back against certain policies, these groups operate within a discursive space that is more aligned with government norms and expectations. Their language, while advocating for rural wellbeing and local influence over policy decisions and implementation, may strategically adhere to the framing conventions expected by policymakers. The proximity between regional, agricultural, and government groups underscores how closely tied advocacy language can be to official policy discourse. The closeness of the government, agricultural and regional (which includes local government organisations) may also suggest a degree of historical path dependency between these groups given government management of water in the Basin was tightly coupled to agriculture for most of the 20th century. The divergence of the environmental and first nations submissions suggests that while the environment may be core to the current policy terrain, this terrain needs significant

change before it meets the aspirations of these two groups.

Corpus-assisted framing analysis

We have chosen to analyse keywords identified using corpus lingustics tools to explore the ways in which different groups make selection and salience choices. Each of the following sections focuses on the identified frames for a particular stakeholder group. Our analysis in each section draws on examination of the keywords, examination of the collocated words of each keyword, and a close reading of how those keywords are used in the context of submissions by each group. For each group we present figures showing:

- our selected thematic groupings of keywords
- ranked lists of collocating words used near the keyword in that group of submissions, and
- the relative proportion of submissions for each group using that keyword.

This presentation provides an illustrative sense of how each keyword is used within that group of submissions, along with which groups do (or do not) make use of that same keyword. We will also provide illustrative quotes from submissions that inform our analysis of each group's frame. There are significant parallels between the frames described in this section and the results of our Q-method study and other author's analysis of print media editorials.[57]

Agricultural

Fairness framing in agricultural submissions

Agricultural submissions frame fairness in terms of the imbalance between environmental and agricultural priorities. Farmers are unfairly burdened by water recovery targets and market structures that favor outside interests. Water recovery targets are ideologically driven by environmentalists living in urban communities who do not understand or value the importance of agricultural work in the Basin's communities and landscapes. Market structures favour well-funded, large corporations and speculators over family farmers.[a] This narrative of injustice centers on the moral breach of an implicit contract between government and rural communities, where farming families, who contribute to national food security and economic stability, are left vulnerable to policy decisions that prioritise environmental outcomes. The fairness framing highlights the difficulties farmers face in competing in water markets, the economic and social impacts of water recovery, and the perceived inequities in how burdens are distributed across regions. Salient terms such as "appalled," "frustrated," and "sacrificed" capture the emotive force behind claims of unfairness, while procedural concerns about governance and the market's design emphasise the need for equity in policy implementation. This frame has strong resonances with one of the Regional frames.

[a]We recognise that some agriculture submissions were from large agribusiness firms. However, finer-grained coding of the submissions would be required to identify differences between agricultural submissions.

The agriculture submissions' frame highlights the sectors' use of water, the history of irrigated agricultural development in the Basin and the and the impacts of water reforms. In this frame, there is a clear focus on farms as family businesses embedded in a community; farms as specific sites of primary production; the challenges and constraints of participating in a water market; system-wide targets for volumes of water in the Murray Darling Basin Plan; water as a commercial input and local flow; local environmental management; and the Basin Plan's prioritisation of environmental outcomes as breaking an implicit contract between government, farmers and regional communities that depend on farming. This frame builds on these

focus areas to focus on the ways the Basin Plan has been unfair because of what is seen as a failure of governments to appropriately balance the impacts of water recovery on agricultural families and communities with environmental objectives. The frame also criticises the implementation of water markets for establishing a market framework in which it is difficult for farmers to compete with large corporations and speculators.

The collocates for fairness concepts* bring out these concerns (see Table 8). Salience is increased by the use of key negative emotive words when describing reactions and impacts. Agriculture collocations with fairness concepts also include a focus on procedural and governance issues and markets. The only collocates that link fairness concepts to environmental concerns are "environment" and "SDLs" (Sustainable Diversion Limits), which are usually presented with negative sentiment.

Table 8: Fairness collocates, agricultural submissions

Theme	Fairness collocates
Emotive	appalled, frustrated, rejected, overwhelming, biased, burden
Procedural	expect, procedural, ensure, ensures, constitutes, rules, supplementary, legal, parliament, historically
Markets	market, licence, distribution, share, meter, metered, burden, forms, compensation
Agricultural	harvest, irrigate
Environmental	environment, SDLs

The framing of farms as family businesses is shown through the three keywords *farming*, *family*, and *farmer* (Figure 6). While many groups of submissions make use of the word family, the usage is distinctive for agricultural submissions because it focuses on how individuals making submissions identify themselves. Submissions by individuals often refer to themselves as specific kinds of farmers, as members of farming families or identify their farm as the family business: this can be seen through *family* as the strongest collocating word with *farming* for agricultural submissions. In some cases this is taken even further where submitters aim to establish their authenticity as a farmer by describing how long or for how many generations their family has owned and operated their farm. Usage of the word *farming* in submissions outside of the agricultural group is more likely to refer to farming in more abstract senses. The Basin Plan's impacts on the long-term viability of family farms form part of the framing of the Plan as being *unfair* policy. This is tied to an agricultural framing that the Basin Plan has led to families and communities in the Basin being *sacrificed* to meet environmental objectives. For example, one submission highlights this theme in the agricultural frame as follows:

> the plan has had a big impact on our farming operations and it is unfair and un-Australian to expect certain areas to be sacrificed. We have two sons who are reluctant to come home to the farm because of the current water reforms and they are not willing to spend their life on a farm with the future uncertainty of water availability [...] and the long term viability of our local community. This is a general view held by most in our area and supported by the fact that there are less young people getting involved in irrigation farming. This is evident in the number of young people available in our district to take on positions on farming committees and sporting clubs are struggling for numbers, relying on imports to field sides. (Mr David May, SSCMDBP)†

Agricultural submissions were also the submissions most likely to talk about farms as specific sites of primary production and land management. The specificity of primary production is shown through two groups of keywords: firstly, *dairy*, *livestock* and *cattle* (Figure 6); secondly, through references to *planting* and specific kinds of crops like *barley* and *cereals* (Figure 7). Invasive species management was an issue raised much more by agricultural submissions compared to other groups through the keyword *feral* (Figure 7).

*Recall that our collocates analysis used the following fairness concept words: fairness, equity and justice and their derivations (i.e. unfair, unfairness, inequity, equitable, unjust, injustice etc). The collocates are those words frequently occurring within a 10-word window either side of the fairness concept words.

†Abbreviations for the inquiries can be found at Table 16 on p.78.

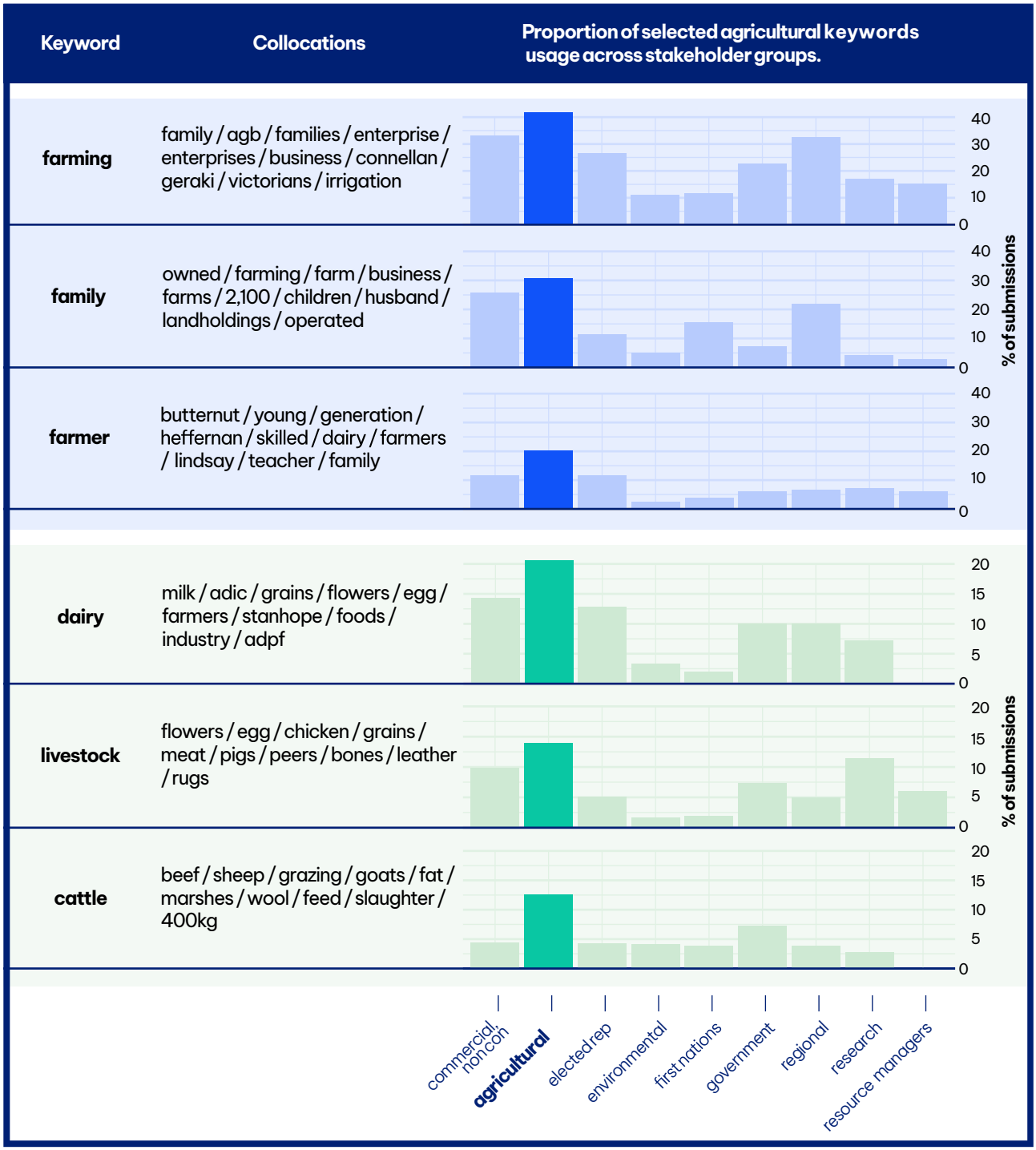

Figure 6: Selected frames and associated keywords for agricultural stakeholders: farming as a family business, with the agricultural stakeholder submissions the most likely group to use the word family, and specific types of farming aligned with broad industry groups such as dairy and livestock.

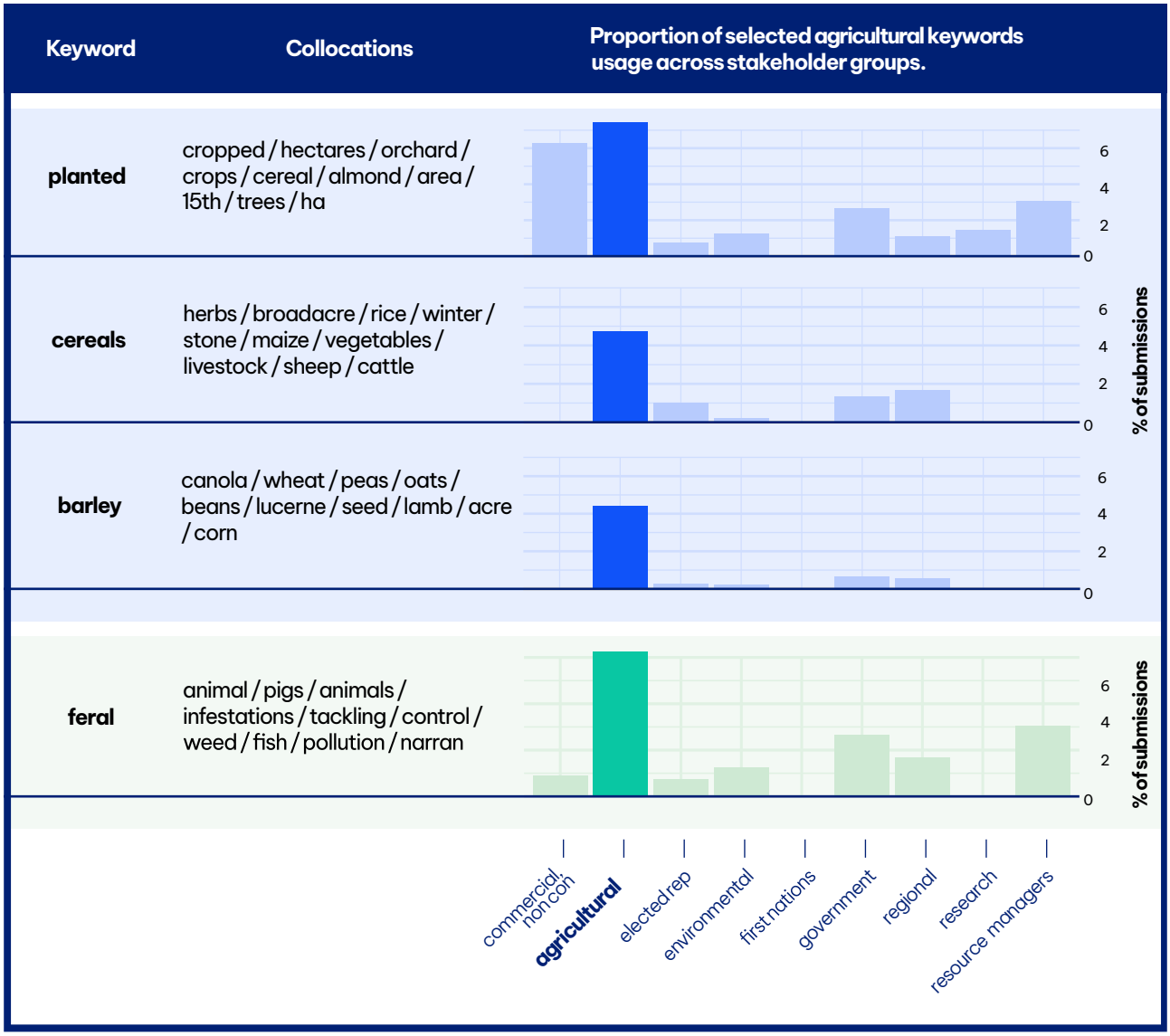

Figure 7: Selected frames and associated keywords for agricultural stakeholders: unlike dairy and livestock, cereals, barley and planted are almost exclusively used in agricultural submissions and not elsewhere. Where mentioned at all, management of invasive species is most strongly highlighted by agricultural submissions and not elsewhere.

The keywords *dairy*, *cattle*, and *livestock* were again most likely to be used in agricultural submissions compared to other groups. While dairy is used in a range of senses in the agricultural submissions, ranging from milk production to types of farming, the uses are less varied in the commercial, government, elected representatives, and regional stakeholder groups where dairy is usually used in a more abstract sense to refer to either dairy farmers as a group, or dairy production as an industry. For some elected representatives dairy appears to be a particular constituency they recognise in their electorate. Unlike *dairy*, there is almost no use of the keywords relating to specific crops outside of the agricultural group. *Planted* is addressed in some commercial (non-consumptive) submissions this is primarily as part of the management of water needs (for example, planted orchards have a different water purchasing profile). The keywords *cereals* and *barley* are almost uniquely addressed in the agricultural group. While the keyword *feral* is most prominently raised in the agricultural frame, the usage of the word is consistent across all groups: where feral animals and invasive species are mentioned at all, they are uniformly presented as a problem that needs to be addressed.

Submissions from the agricultural group directly addressed two of the key targets of the Basin Plan: the aim to recover *450* GL of water for environmental flows, and the initial *650* GL target for the Sustainable Diversion Limit Adjustment Mechanism scheme projects to achieve environmental outcomes without additional water recovery (Figure 7). Additional to these two specific system level goals agricultural stakeholders also use the megalitre unit in abbreviated form as *ml* to refer both to the price* of water and also flows and specific quantities of water.

Submissions from the agricultural group expressed concerns about the impact of the 450 GL target for environmental water recovery, with strong opinions about the economic and social impacts of achieving this target, and also calling into question whether this target is realistic, let alone desirable. Many of the submissions expressed concern about how the 450 GL target would have significant negative impacts in their area and questioned the fairness and equity of a target that, in their view, prioritises environmental outcomes over the future of agricultural families and communities. The submissions made it clear that the 450 GL target has become a stand-in for the whole of the Basin Plan for some stakeholders (although is a system-wide target that is intended to be achieved through a complex system of Federal/State/catchment mechanisms). Fairness is also framed in terms of the sharing of burdens across the Basin in some submissions, with concerns about communities and areas being *targeted* for buybacks or suffering as the result of prioritising particular environmental assets like the Lower Lakes.

> Northern Victoria was unfairly targeted in 2008 buybacks and we had more high reliability water purchased than any other state. Over 600 GL of high reliability products were purchased during this time and over 500 GL came from Victoria. These buyback programs resulted in stranded irrigation infrastructure assets and higher costs for remaining farmers in the Goulburn Murray Irrigation District and Lower Murray Water's pumped irrigation districts around Mildura, Red Cliffs and Merbein. [...] There is overwhelming evidence from multiple sources that the 450 GL cannot be recovered without causing social and economic harm. (Victorian Farmers Federation, WARORB)

> It is completely unfair to expect the rest of the basin to suffer the impact of the Basin Plan when nothing is being done about addressing the huge loses in the lower lakes. [...] It is obvious the implementation of the basin plan is having an enormous impact on our region and we hope this inquiry will have the ability to influence Government to slow the process. (Wakool Landholders Association, SSCMDBP)

A number of submissions frame this narrative of unbalanced and unfair distribution of burdens by describing farming and rural communities as *collateral damage* accepted by governments and urban Australians in the pursuit of environmental aims.

> The primacy of the perceived environmental benefit over the economic and social wellbeing of the communities of the basin is misguided, unjust and inequitable. [...] like many other land owners on our reach of the river, [we] feel we are at risk of becoming collateral damage in a process

*Our tokenisation process removed symbols like $, meaning that it will not be present as a collocation.

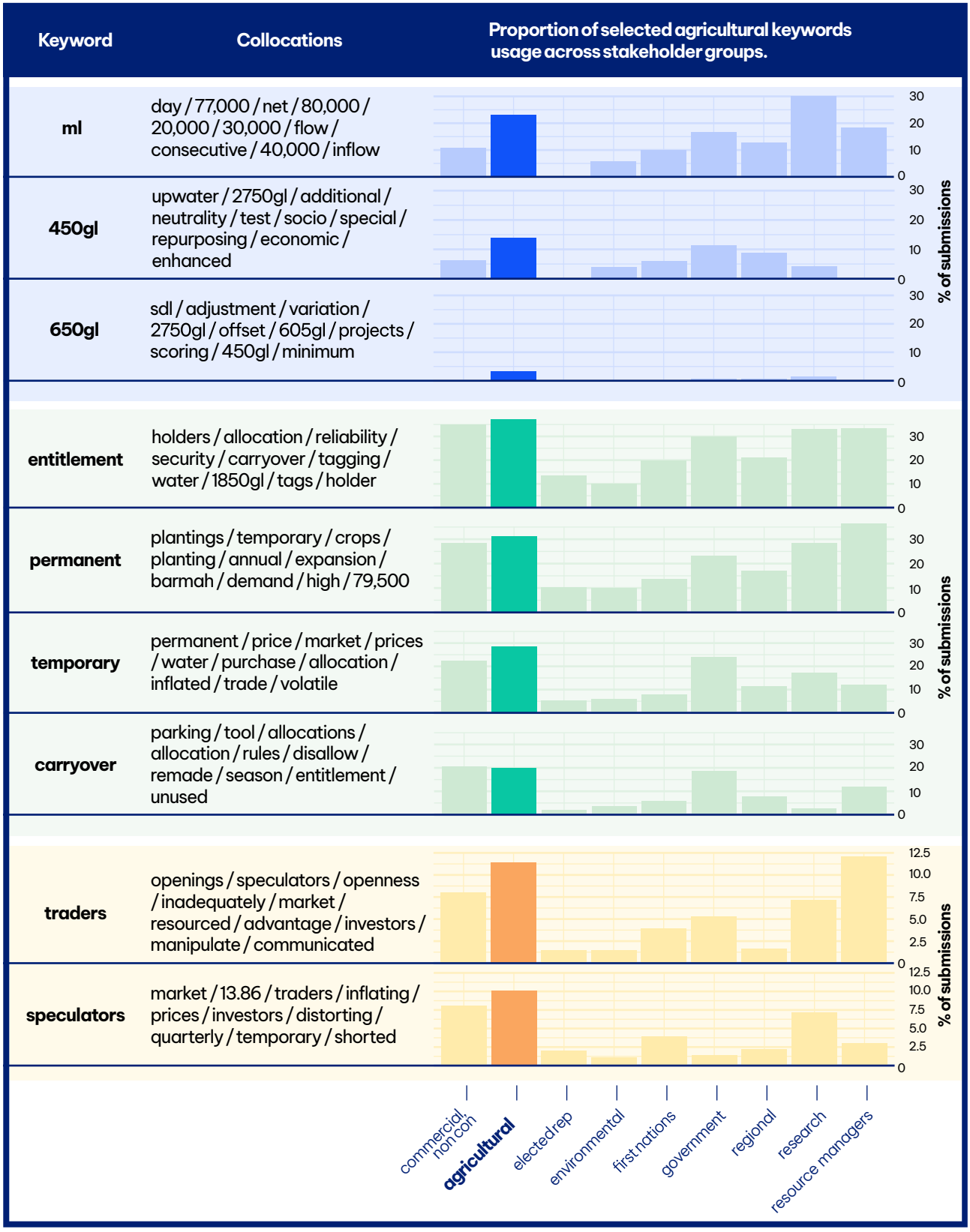

Figure 8: Selected frames and associated keywords for agricultural stakeholders: measurement of water as input and the high level figures in the Murray-Darling Basin Plan, specific rules for the management and types of water trading, and actors in the water market that are not themselves users of water.

> driven by the ideological pursuit of perceived environmental gain. (Goulburn River Trout Pty Ltd, SSCMDBP)

This perception of an unfair distribution of burdens is also framed as a broken contract - the agricultural sector and rural Australia contribute to national and international food security, Australia's export income, regional jobs and the social capital to provide for well-being in regional communities, in return governments should provide access to water and associated infrastructure.

> Irrigators will continue to come under pressure from environmental groups who will want the environment saved possibly at the expense of our food security, possibly at the expense of our wealth production and possibly at the expense of our job security and local communities. (Patrick Secker MP, Hansard)

The broken contract storyline in the agricultural frame builds on the history of 20th century development of the Basin under the "doctrine of development before settlement", which provided significant public policy support for agriculture. Public support underpinned by a policy perspective that agriculture and irrigation infrastructure should receive government support because of their contribution to national wealth and national character. Investment in irrigation infrastructure and irrigation communities were framed by contemporary commentators as investments in national development through closer settlement "a high level of local facilities, amenities, and secondary activities. This increases and retains population in rural areas."[58,59]

Agricultural submissions also raised concerns about the operations, actors and impacts of the water market. Firstly, the submissions address the complexity of how different categories of water acquired and traded through keywords like *permanent*, *temporary*, and *entitlement* (Figure 7). Secondly, the actors in the water market are addressed through the keywords *traders* and *speculators* (also Figure 7).

These two groups of keywords directly address the complexity of the water market and are also used widely by many other stakeholder groups. *Permanent*, *temporary*, *entitlement* and *carryover* are all used to refer to the purchase and management of water. Permanent can also be used in a different but related sense to refer to permanent plantings such as orchards: permanent plantings and annual crops imply different needs for agricultural water use. A major undercurrent relating to this element of the agricultural frame's storyline is the concern that a water user may not be able acquire enough water at an appropriate price for their business to be viable. Many agricultural submissions embed this narrative by making the argument that the market rules and/or market participants cause the price of water to be unfairly higher than it would be otherwise. The exact elements of the storyline vary and include, but are not limited to: allowing participants in the water market, who are not themselves water users (i.e. traders and speculators), increases price pressure during times of scarcity; the increase in permanent plantings in the Southern Murray Darling Basin will price out other participants; and carryover rules are complex and privilege certain water users. The very use of the word speculator in these contexts has negative connotations and is commonly used to imply (if not outright state) that their very presence in the market is a distortion. These elements of the agricultural frame's storyline cast fairness in the context of legitimate and illegitimate participants in water markets alongside fair drivers of water price changes (e.g. weather events) and unfair drivers (e.g. speculation, growth in corporate permanent plantings).

The storyline surrounding markets in the agricultural frame is nuanced and reflects an understanding of water markets as a policy tool. While often aligning with the government position that "[i]t is not the role of the market to ensure this [reforming industry and the redistribution of wealth and opportunity] is equitable" (MDBA), the storyline highlights the value judgements embodied in water market design. Fairness in this storyline relates to the potential for fair competition between those who intend to use water. The storyline frames market design as inherently unfair where "speculators have the ability to adversely impact the efficient functioning of water markets by withholding water to raise prices, conducting allocation transactions to manipulate water markets and distorting market information to suit their interests." (SunRice Group) Where market design allows for the participation of a range of non-water users, the design itself is unfair because the market no longer primarily serves "those involved in agricultural production" and this leads to "perverse outcomes" where major beneficiaries are "investors and traders". There is reference to the environment to

support this storyline among some agricultural submissions where "[w]hat the players in the water market want and what the river systems need may increasingly be at odds." (Renmark Irrigation Trust)

Environmental

Fairness framing in environmental submissions

Environmental submissions frame water management as unfair, demanding radical changes to the current system, which favors irrigation and big business at the expense of the environment. The environment is most likely to be personified in storylines from the environmental frame, which uses a crisis narrative to emphasise the vulnerability of critical ecosystems - and their wetlands, rivers, fish, and birds - and argue that over-allocation of water to agricultural users has pushed these ecosystems to the brink. Fairness is a moral obligation to restore balance, with references to Australia's international commitments, such as the Ramsar Convention, and Aboriginal water rights. These submissions call for urgent, systemic reform, arguing that the current approach unfairly prioritises agricultural uses, threatening future generations and marginalised communities – a framing consistent with many ideas of ecological justice. Procedural fairness is also a key theme, with demands for appropriate representation for the environment in an overhaul of water-sharing policies to secure a sustainable future for all Australians.

Environmental submissions frame the policy issues surrounding the management of water in the Basin using a focus on the natural world, including specific locations, habitats that are of environmental significance such as *wetlands* and *marshes*, and also *wildlife* such as *fish* and *birds* (Figure 9). They also highlight the vulnerability of the environment through keywords *stress* and *vulnerable* (Figure 9) and use this vulnerability to argue for particular policy responses, especially in the context of arguing for the recovery of more water for the environment and other non-consumptive uses.

Environmental submissions are most likely to use *the environment* as a noun rather than the more common adjective *environmental* that is used across most groups. This builds a narrative where the environment is an entity that gives life and underpins everything else in the Basin. For example,

> We need to allocate enough water to the environment. Without the environment, forests and wetlands, the catchment would cease to exist. (River Country Campaign of Friends of the Earth, SSCMDBP)

Similarly, in addition to the specific sites and species keywords, the *river* and *nature* are often personified as sources of wisdom and moral right opposed to modern or western thought in environmental storylines.

> When we study the natural ecology in the field, we study true science, taught by Nature, not people. To anyone with a deep understanding of the natural ecology of Australia and with a life time study of natural phenomena as true Science of the function of land and water based ecosystems, the M-DBP is just another example of the collapse of Western thinking / culture / civilisation in our time, doing more of the same over time and expecting a different result. (Paul Newell, SAMDBRC)

The environment and nature are often cast in these storylines as being unable to represent themselves. A key role for adherents of the environmental storyline is activism to give nature a voice, "[f]rom community activism to national campaigns , we seek to give nature a voice to support the life that supports us all." (Wilderness Society, WARORB). This voice is needed to support the intrinsic value of nature outside of the economy or the market.

> Nature is unable to represent itself. It has intrinsic value other than as a money making entity. It's what makes Australia our beautiful and precious home. The trees along our rivers cool the air , land and water and provide shelter to other creatures in our Australian environment. Instead of trashing our countryside with monoculture cotton crops we need to preserve it for the future, our descendent and for visitors to come and see. Please insist on fair water distribution. (Fiona Baker, NSWSCFPH)

Perspectives on water markets are divided in environmental storylines. For some, the environment is now another water user in the Basin, an irrigator whose water rights need to be protected from others.

> The environment is now considered an irrigator, it too has infrastructure, and it too has its own water. How about stop eying *[sic]* off the environment's water and work within your water means for a change. (Sally Richards, SSCMDBP)

For other environmental storylines, water markets are ethically treacherous territory. Commodifying the *lifeblood* of the Basin for profit:

> Water trading was originally designed to save water. Now it is used by commodity traders and big business for profit. It is immoral and economically irresponsible to allow this to happen. (Name suppressed, NSWSCFPH)

Collocates most associated with fairness concepts buttress this environmental frame (Table 9). Specific environmental collocates are combined with those relating to procedural issues and the need for substantial change (*overhauling*, *changing*, *demand*, *inquiry*) alongside a focus on stakeholders, which include the environment itself, *rivers*, *flows*, *floodplains* future *generations*, *towns* and Aboriginal *nations*. *Irrigators* are associated with other *vested interests* who favour material interests over the environment.

> the emphasis in this legislations [*sic*] case must be to ensure that the MDB environment is healthy and it can survive long-term droughts without the added threat of the ridiculous over-allocation that had been happening with full knowledge of irrigators, communities, governments, corporations and other vested interests who refused point blank to act until the MDB collapsed. (Maria Riedl, SSCMDBP)

Table 9: Fairness collocates, environmental submissions

Theme	Fairness collocates
Environmental	flow, restoring, rivers, floodplain, sustainability, environmental
Procedural	allocated, allocation, overhauling, changing, stakeholder, share, demand, balance, theft, inquiry
Stakeholders	generations, stakeholder, aboriginal, mldrin, nations, towns, irrigators

Fairness requires radical change from a status quo that is seen as biased towards irrigation uses for the Basin's water resources leading to outcomes that are unfair to the environment and other Australians: "The Macquarie Marshes and Gwydir Wetlands need more water, not less. It is totally unfair for big businesss to be allowed to cause so much damage to the ecosystems that belong to Australians living today" (Nancy Pallin, MDBABPA). Demands for radical change are often associated with a crisis frame in environmental submissions, which associates fairness with demands for urgent government action to return more water to the environment to address existing ecological crises resulting from the "over-allocation" of water for irrigated agriculture and to ensure the preservation of the environment for future generations.

> Unless there is a radical change in the commitment by the NSW Government to river sustainability and fairness between all water users as expressed through NSW water sharing plans and their successors, I remain concerned that future societies will be witnessing a "dead Darling", and a similarly disastrous Lower Balonne "floodplain" (Geoff Wise, SAMDBRC)

> There's no point in quibbling over exactly what a fair flow might have been and trying to finesse the figures. Clearly the total death of a mighty river that once supported paddle steamer traffic from Wentworth to Wilcannia, shows that the flow in the South West is nowhere near fair and equitable. (Penny Auburn, NSWSCFPH 2021)

The crisis frame is made explicit in a number of submissions coupled with criticism of the status quo. For example,

> **Australia is facing a water crisis**
> Safe and sufficient water is one of the substantive components of the right to a healthy and sustainable environment. Water pollution, water scarcity and water-related disasters impinge on the access of communities to many human rights. Vulnerable and marginalised groups experience a disproportionate denial of these rights. Current settings do not treat life sustaining and indispensable water with care and respect. [...] Chronic overallocation of water is threatening livelihoods, communities, and all life that depends upon healthy rivers. [...] To conserve the biodiversity, ecosystems, and ecological processes dependent on the water resources in NSW, environmental water needs must be met before water is allocated to other uses. When water extraction is permitted, adequate water must remain in the environment to maintain biodiversity and ecological processes. (Nature Conservation Council of NSW NSWSCFPH, original boldface title)

> WAC believes that the BP does not incorporate the fundamental shift in philosophy and management priorities required to prevent a water crisis during prolonged periods of low inflow, as experienced during the Millennium Drought. The mismanagement of the system at that time, in failing to adequately conserve water for maintenance of environmental flows, especially to the Murray Mouth, had devastating impacts on the river system and its environment [...] It is clear that, far from being a result of purely climatic factors, the crisis precipitated by the rampant overallocation of the water resources of the Basin over many decades, stripped the river system of its inherent ability to resist drought (John Caldecott, MDBABPA 2017).

The keyword *fish* received particular attention: both because fish were part of the organised campaign in 2017, but also many later submissions made references to the high profile sequence of fish kills that occurred in theBasin during late 2018 and early 2019. Perhaps because of these events fish received more attention than birds and other wildlife across all groups of submissions. Fish are the only animal to appear consistently in our Twitter analysis, again reflecting the prominence of the fish kills in media reporting (see Figure 24).

The environmental frame also includes a storyline that frames protecting and restoring the environment as an "obligation" with reference to international conventions and agreements Australia has ratified. This includes particular reference to the *Ramsar* Convention and other agreements on *migratory* birds - these keywords are shown in Figure 9. The discussion of not just wetlands but Ramsar wetlands is intended to place these particular sites as sites of international significance rather than just local significance. Ramsar is mentioned specifically, but the submissions also refer to "international obligations" and the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP). First Nations, Resource Managers and Government frames also use the obligation storyline.

> To achieve the environmental outcomes of the Basin Plan and meet Australia's obligations under international treaties [...] [a]vailable water for the environment should be increased. (Chris Pavich, MDBABPA 2017)

> A sound, evidence-based case can be made to increase the recovery volume, with a minimum of 415 GL required just to meet international obligations to protect wetlands, migratory shorebirds and biodiversity values under the Ramsar Convention, CAMBA and JAMBA migratory bird agreements. (Anne Jensen, MDBABPA 2017)

It is in the focus on words for entities in the landscape, the use of a crisis narrative, and the personification of the environment and nature that we where we likely see the divergence in the lexical field of environmental storylines identified by the cosine similarity analysis (see Figure 5).

Addressing campaign submissions

More than half the submissions (264/477) coded as environmental were made to a single inquiry: the 2017 MDBA Basin Plan Amendments Inquiry. Many of these submissions drew on a campaign submission template, which results in submissions that are extremely similar with sentences repeated verbatim. The aim of this campaign can be summed up by one of these sentences: "The Northern Basin needs at least 415 GL returned to the environment", referring to the maximum recovery targets for the Northern Basin (see further discussion in Regional for examination of the lower water recovery options). These submissions have a large impact on our keyword analysis and many of the top keywords are a product of this campaign. While this has the potential to skew our analysis we highlight that the use of campaign submissions is mechanism by which inquiries contribute to civil and democratic society. By enabling people to have their say on a specific issue, campaigns run by advocacy organisations can increase engagement from a greater number of stakeholders that might not otherwise contribute. The benefits of greater engagement need to be balanced against the knowledge base of those submitting campaign submissions. There are strong arguments based on good empirical evidence that people's engagement on public issues is guided by group identity rather than considered engagement with the issues at hand.[60] Such identity-based engagement is more likely in the case of campaign submissions.

Figure 10 shows some of the keywords and the repetition of collocations resulting from this campaign. To address this campaign in examining the finer details of environmental submissions we take the approach of stratifying our sampling by inquiry: instead of choosing 20 concordance lines across all submissions in the group we sample up to 10 concordance lines from the MDBA Basin Plan Amendments Inquiry and up to 10 concordances lines from environmental submissions to all other groups. This approach ensures that our close reading engages with a variety of submissions and not just the single campaign.

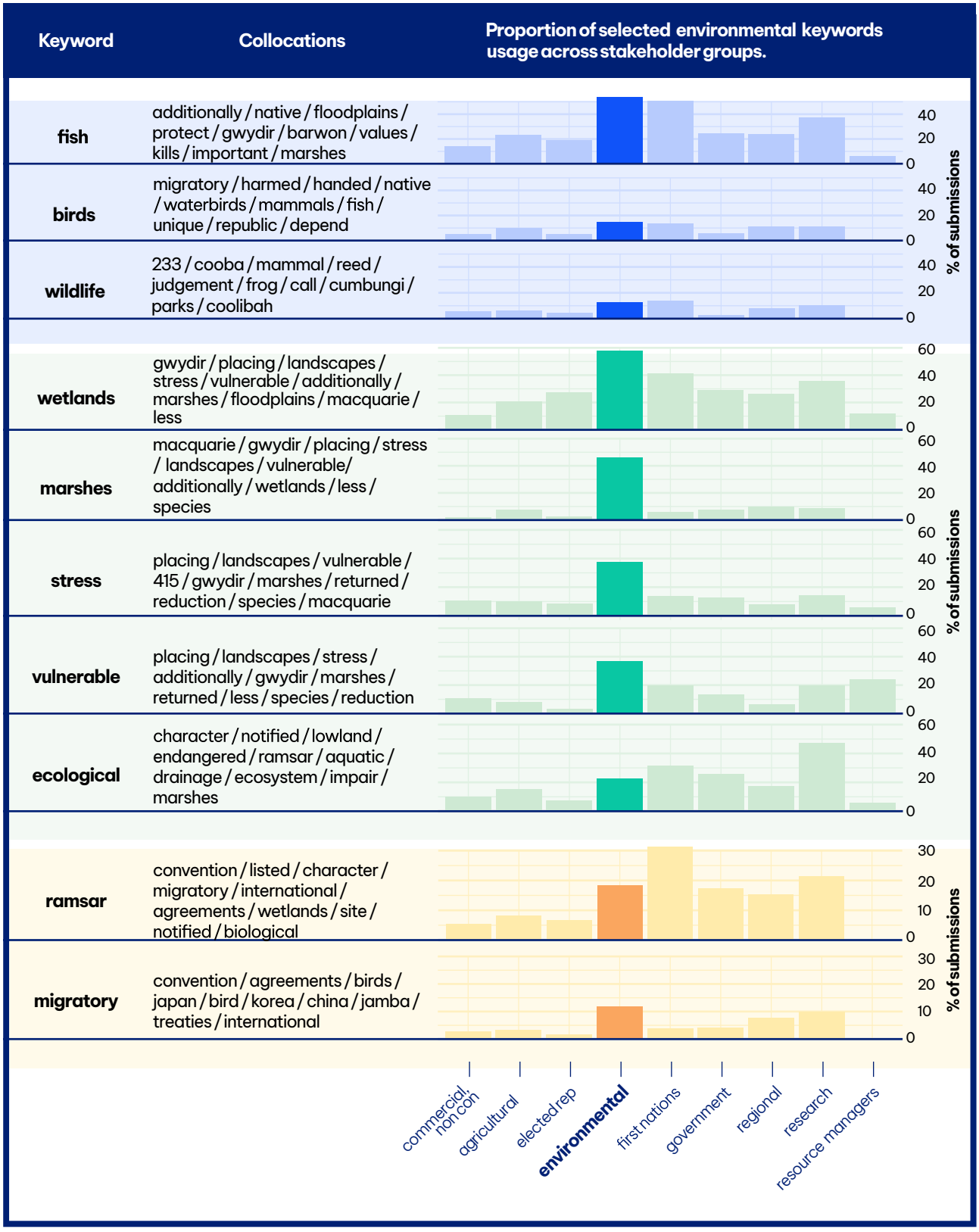

Figure 9: Selected frames and associated keywords for the environmental stakeholders: fish, birds and wildlife as important parts of the natural world; wetlands and marshes as sites of stress and crisis in nature; and Australia's obligations under international treaties.

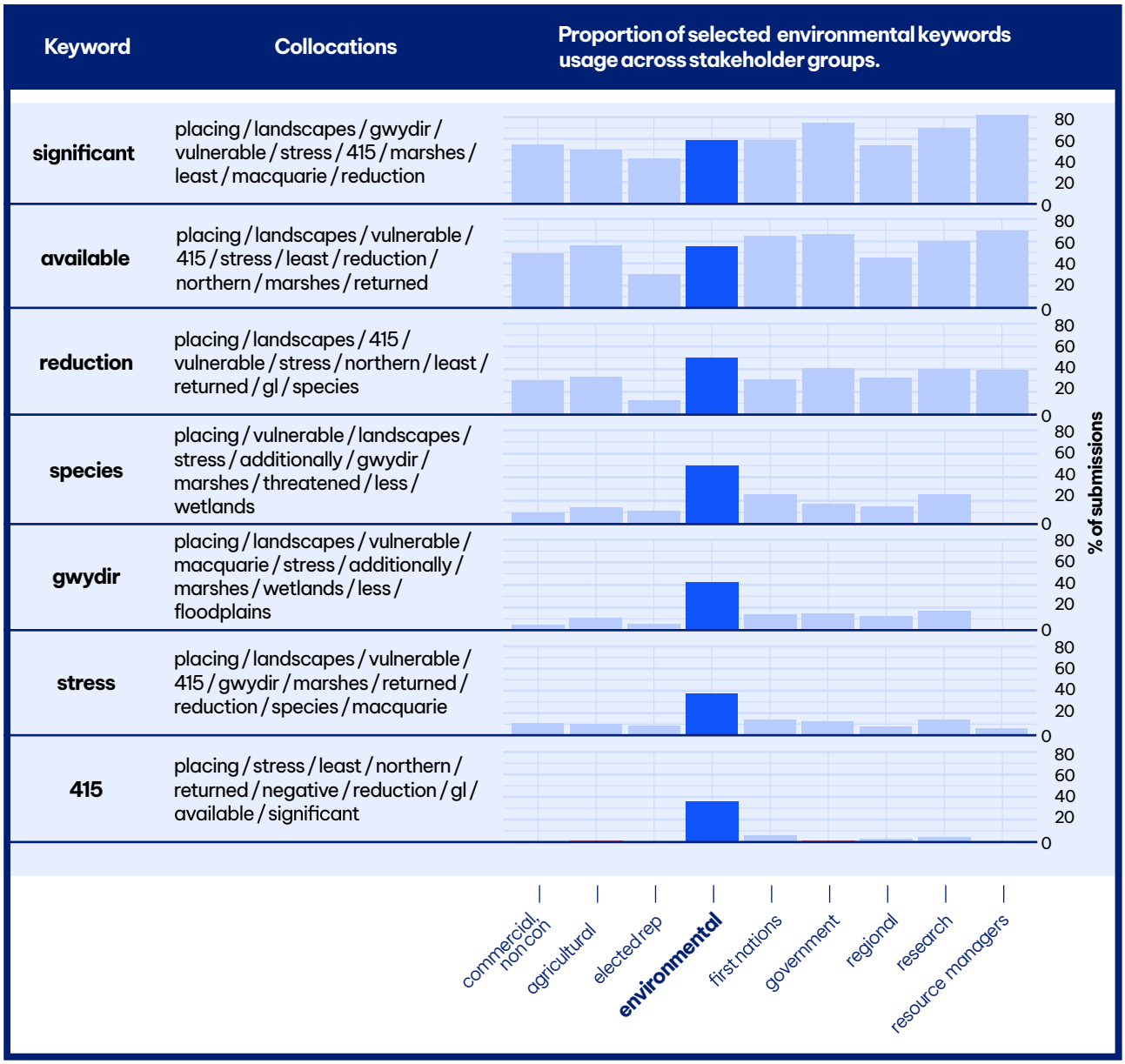

Figure 10: The impact of an organised campaign for submissions to the MDBA Basin Plan Amendments Inquiry - a high number of submissions contained exact or near duplicate text indicated by this group of keywords.

First Nations

Fairness framing in First Nations submissions

First Nations submissions frame fairness through a storyline that emphasises connection to Country, dispossession and restorative justice. Central to this framing is First Nations peoples' cultural and spiritual connection to Country, where water is seen as a sacred and integral part of life. Fairness requires addressing the historical and ongoing dispossession of First Nations peoples from their lands and waters by restoring inherent water rights. Water reforms of recent decades represent a "double dispossession", compounding the losses caused by colonisation. Governments must address Aboriginal water rights in the Basin to meet their obligations under international agreements such as the UN Declaration on the Rights of Indigenous Peoples and the Convention on Biological Diversity. However, this narrative frames fairness as not just a matter of legal rights but as a necessary step toward healing and restoring the health of both the environment and First Nations communities. Transferring water to First Nations ownership alongside incorporating Traditional Knowledge and First Nations peoples in water policy decision-making provides a pathway to justice and sustainable water management.

First Nations submissions build their framing storyline on the strong cultural and spiritual connections First Nations' peoples have to lands, waters and Country, the traditional uses of natural resources, and a history of colonisation and dispossession. Few of the keywords used to define the First Nation's frame are shared with other groups and this divergence is confirmed by the results of the cosine similarity analysis (see Figure 5. The closest frame to First Nations is the Environmental one although there remain significant differences. Fairness in the First Nations frame is closely linked to *rights* and restorative justice that addresses the dispossession of First Nations people and restore their inherent rights to the Basin's waters. Australian law and international agreements and guidelines are key to these claims, with submissions in this group making reference to Native Title and the UN Declaration of the Rights of Indigenous Peoples, the Convention on Biological Diversity, and the Akwé: Kon Guidelines (see Figures 11 and 12).

> Nations of the Murray Darling Basin have distinct rights and cultural obligations relating to water, waterways and river Country. These rights have been recognised and affirmed in international agreements to which Australia is a signatory, including the United Nations Declaration on the Rights of Indigenous People (UNDRIP) and the Convention on Biological Diversity (COB). [...] First Nations have been marginalised from water management and decision making, and dispossessed from water access and ownership. (Murray Lower Darling Rivers Indigenous Nations (MLDRIN), WARORB 2023)

A quite different conception of *obligations* separates a key element of the environmental and First Nations storylines. The First Nation's storyline emphasises obligations First Nation's people have to Country; the environmental storyline focuses on Australia's obligations to international agreements. First Nations submissions pick up international agreements using the language of *rights*, particularly with regard to ownership and access to water as well as influence over water management decision making.

In this narrative, First Nation's *obligations* arise from the long-standing connection of First Nations people to Country. First Nations' *culture*, *traditions* and *customs* create a *sacred* connection the lands and waters of the Basin that pre-dates colonial dispossession and the development of the Basin's water resources and landscapes. First Nations' peoples are described as having a unique relationship with, and responsibilities for, the Basin's lands and waters. Development of the Basin's water resources represents damage to this relationship and First Nations' cultural heritage. Consequently, the health of the the Basin's ecosystems is directly linked to the health of First Nations' peoples.

> Our people and the Basin land and waters have a relationship that spans all time. We have always been here, and we will always be here. [...] We acknowledge our ancestors, our elders and their role in maintaining healthy, rivers and wetlands and caring for all of the animals and plants under each Nations cultural LAW. We note the damage that has occurred in their lifetime, and ours, to our natural and cultural heritage. We are one with our lands and waters, and damage to our Mother Earth is damage to us all, our children, and our children's children. Our water is our lifeblood, and all of us depend on healthy rivers and wetlands. (Northern Basin Aboriginal Nations (NBAN), SAMDBRC)

> In the Aboriginal world view, people and Country (including lands, waterways and seas) are interdependent entities that are intrinsically linked in the landscape through cultural and spiritual significance. This means that there is no separation of nature and culture - the health of the natural environment and cultural wellbeing of Aboriginal people is directly influenced by the health of the cultural landscapes. (Leslie P Duncan, PCNWR)

First Nations' dispossession is highlighted in almost all submissions. And sometimes a comparison is made with the losses claimed by agricultural groups in debates over water reform in the Basin.

> Although consumptive users and some rural business owners are loudly expressing their concerns about the impacts of the 390 GL environmental water allocation, the truth is their threatened social and economic disadvantages pales into insignificance compared with the impacts and traumas suffered by First Nations people including the dispossession and removal from our traditional lands under Government policies and practices throughout the development of the Murray-Darling Basin. (Northern Basin Aboriginal Nations (NBAN), MDBABPA).

The legacy of settler dispossession of First Nations' peoples continues from initial colonisation to the present in this storyline, which expresses particular concern with the way *neoliberal* water reforms have compounded the unfairness of this ongoing loss. *Water justice* requires ways to restore what has been lost. Restoration in the framework of settler law creates dissonance between First Nation's values and obligations and the pragmatic politics of addressing past and present injustices.

> For many First Nations peoples, the separation of water from land, the formulation of water 'products' as commodities that can be held and traded for private profit and the disembodiment of water from its sacred and spiritual contexts are fundamentally at odds with deeply enshrined water values and custodial responsibilities. Nevertheless, under current governance arrangements, the most viable, immediate pathway for Traditional Owners in the Murray-Darling Basin to access water is via entering the water market [...] Water markets can play an important role in addressing the injustice of the 'double dispossession' of Aboriginal people when it comes to water in Australia, but only if market rules and operation enable this outcome (Murray Lower Darling Rivers Indigenous Nations (MLDRIN), MDBWMI)

> The NWI should require all jurisdictions to develop mechanisms to re-activate First Nations water rights within the context of 'water justice' or restoring inherent rights that have been interrupted through colonisation and displacement of First Nations people. (MLDRIN PCNWR)

In addition to direct water ownership and control, other key elements of any rapprochement between First Nations and other water users in the Basin in this frame include the "procedural justice" of First Nations involvement in decision making with regard to water policy in the Basin alongside the recognition of the value of traditional knowledge for water management.

Collocates most associated with fairness concepts in the First Nations frame (see Table 10) include *Indigenous* and *Aboriginal* and the names of Indigenous nations, *Ngarrindjeri* and the *Yarluwar-Ruwe* Plan of the

Ngarrindjeri Nation. Fairness collocates also reinforce the First Nation's storyline of the *legacy* of injustice arising from *dispossession* with its *persistent* and *enduring* losses. The storyline also picks up potential remedies for this past in procedural changes that increase First Nations *participation* and *engagement* in water planning that addresses First Nations' inherent *rights* to Country. This requires First Nations groups be properly *resourced* and proper recognition of First Nations' *knowledge* and *practices* in water policy. The names of researchers linked to the academic literature on Indigenous water rights are also collocates for fairness concepts primarily due to the use of academic referencing in these submissions that draws on the Research genre discussed below.

Table 10: Fairness collocates, First Nations submissions

Theme	Fairness collocates
First Nations	indigenous, aboriginal, ngarrindjeri, ruwe, ruwar, yarluwar
Legacy	persistent, enduring, dispossession
Procedural	participation, engagement, resourced, rights, interests, framework, distribution, consideration
Knowledge	knowledge, practices
Researchers	graham, lukasiewicz, mcKay, robin, schilizzi, markham, jackson, hartwig

Two First Nations' organisations, the Northern Basin Aboriginal Nations (NBAN) and the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) are also keywords (Figure 12). They occur as keywords in three ways: because they themselves are making a submission to an inquiry; because their materials are being cited or their organisation otherwise referenced in another submission; or in a small number of submissions, comments are made about these organisations' representation of particular groups' and peoples' interests.

Limitations

Submissions from First Nation's individuals and representative groups are the second smallest group of submissions, with only 51 out of the 2271 documents we consider in this analysis assigned to this group. Furthermore, many inquiries failed to achieve meaningful engagement from this group. For example, in the 2015 Select Committee on the Murray-Darling Basin Plan we assigned only 2 out of 399 submissions to this group. Our partially decontextualising assignment of submissions to single groups is the most limiting and problematic with the First Nations group as there are clear instances where submissions could have been meaningfully assigned to more than one category.

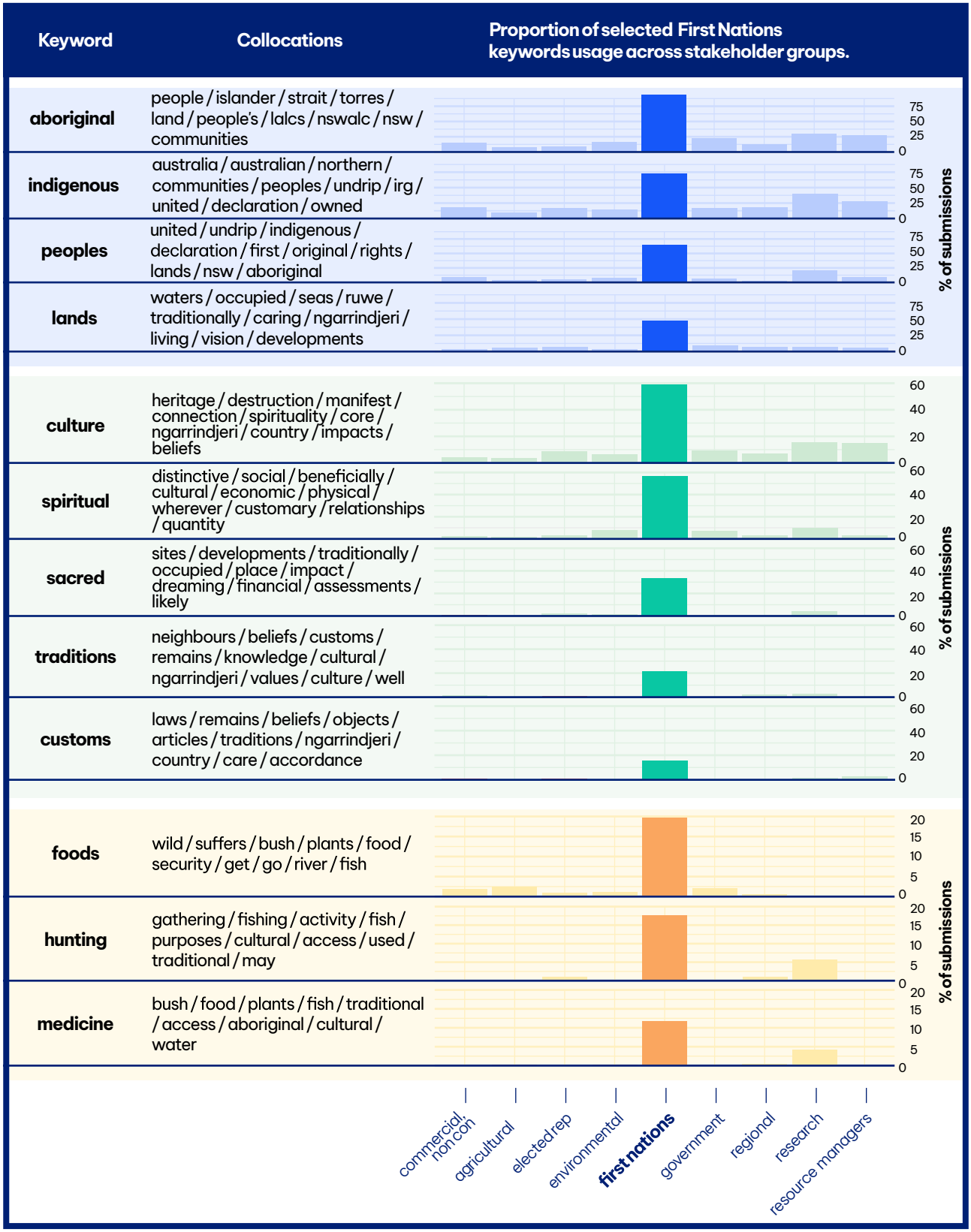

Figure 11: Selected frames and associated keywords for First Nations stakeholders: Indigenous identities and connections to lands and waters through culture, traditions and customs; specific land uses connected to the same practices that are distinct from all other stakeholder groups.

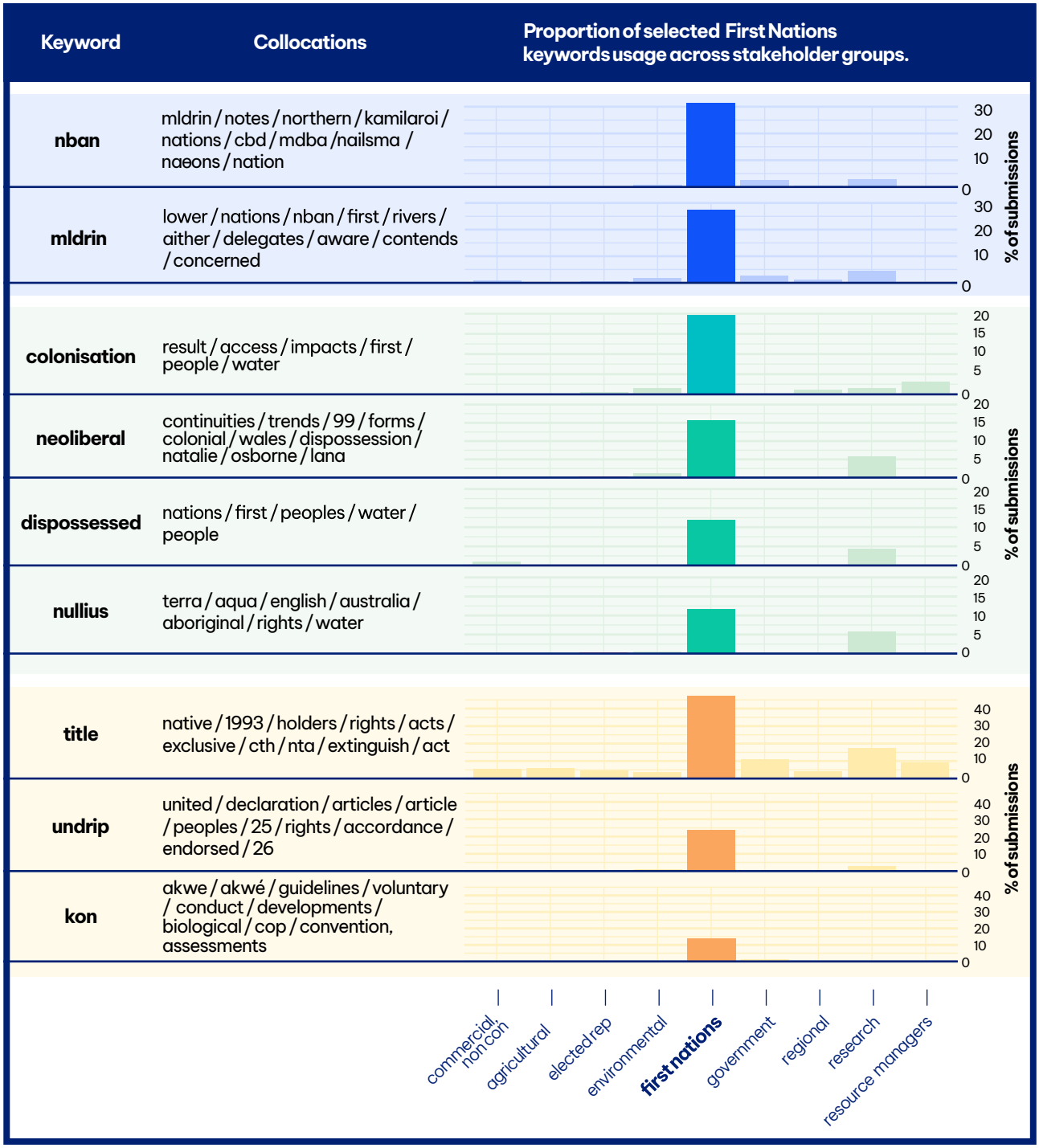

Figure 12: Selected frames and associated keywords for First Nations stakeholders: representation and engagement through groups funded by the MDBA; the history and continuing impacts of colonisation and dispossession; legislation, international treaties and cultural frameworks for engagement.

Regional

Fairness framing in regional submissions

Regional submissions present two distinct frames that emphasise the importance of local identity, knowledge, and wellbeing in water policy decisions for the Murray-Darling Basin. Both frames emphasise the failure of urban policymakers from centralised government bureaucracies to understand the real-world impacts of water policy change on rural communities. The first frame highlights the social and economic harms inflicted on rural communities by water recovery targets. Water recovery is seen as unfair and unjust because it disproportionately imposes concentrated burdens on rural communities to appease the "ideological" aspirations of city-dwellers who do not know about or live in the Basin. The second frame focuses on addressing ecological decline in the Basin and the corrupting influence of corporate interests on policy design and implementation. This frame has strong parallels with the Environmental frame and contrasts corporate (often international) interests with small, local farmers who are stewards of the environment and the backbone of rural communities. Both frames argue that regional voices and local knowledge should be central to policy design, advocating for equitable outcomes that support the livelihoods and resilience of rural communities in the Basin.

Two distinct regional frames are centred around a set of keywords relating to personal and local identity: *resident*, *lived*, *local*, *town*, *region*, *lga* (Figure 13 and Table 5). One frame has distinct parallels with the Agricultural frame and the other with the Environmental and First Nations frames. This emphasis on place is used to position submission authors as credible sources of knowledge with standing to discuss issues affecting their local region. This positioning and local focus on the impacts of water policy is also a core driver of the content of submissions, particularly those from local councils or regional advocacy groups like the Murray Darling Association (see Figures 13).

Both regional frames' storylines relate water policy changes to negative impacts on regional wellbeing and spillover effects to the broader community. The first frame focuses on the negative impacts of water recovery. Regional submissions on proposed changes to reduce the amount of water recovered from the Northern Basin are prominent in our corpus, with keywords for *320* and *390* GL as the headline water volumes for proposed alternatives (Figure 14 - see also the 415 GL maximal target discussed in Environmental). Fairness is framed by this storyline by highlighting the failure of centralised government organisations to understand or take account of impacts of water recovery on regional communities.

> the communities of the Qld Border Rivers should be entitled to an equitable application of the overall reduced recovery targets, to ease pressure of farmers, businesses, and communities in this area [...] the assessment by the Authority that most communities in the Qld Border Rivers region have not been greatly affected by the reduced availability of water is erroneous, and demonstrates a lack of effective consultation and local knowledge in this area [...] an increase in of 6GL from the Basin Plan setting will [*sic*] is inherently unjust and unjustifiable, given that the range of water recovery scenarios considered by the Authority are only able to offer slight improvement in environmental outcomes, and will impose significant adverse social and economic consequences on the region. (MDA Border Rivers Region, MDBABPA)

While not as prominent as in the Agricultural frame, regional submissions also adopt the storyline of government policy treating regional communities as *collateral damage* in pursuit of overly ambitious environmental goals set primarily in Australia's major cities. This storyline represents towns, communities and people as *vulnerable* to the impacts of water recovery. Notably, the Environmental storyline also uses a vulnerability trope but applies it primarily to ecological communities, fish, wetlands, birds and landscapes. This regional frame's storyline characterises government policy as placing unfair weight on an environmental perspective

and exploiting the limited understanding that metropolitan Australia has of the realities of lives lived in rural Basin communities.

> By limiting access to water that is rightfully owned by the farmers as outlined in the MDBP, planning ahead and looking to the future becomes difficult. Rural communities are resilient but they can only tolerate so much before it becomes an impossible task. [...] I remain a proud supporter of my community and am astounded that people in metropolitan areas are unaware of where their food is produced. It is disappointing to hear incorrect statements about farmers damaging the environment. Farmers are the ultimate environmentalists as they depend on a healthy environment for their businesses. (Nicole Alexander, SSCMDBP)

Table 11: Fairness collocates, regional submissions

Theme	Fairness collocates
Concerns	eroded, debt,neutrality, confidence, serve, trading, rectify, neutrality, obligations, health, consistent, advantage, share, complying,

In this storyline, the Basin Plan was engineered by "bureaucrats and politicians" influenced by "city experts spawning ideology to solve perceived country problems" (Colin Wood, SSC MDBP 2015) leading to policy outcomes better understood as "*Green Vandalism*" (Jeanine Bird, SSC MDBP 2015) when it comes to the impact on regional communities.

> The MDBA is gradually dismantling Australia's ability to produce from its main food bowl by at least a massive 20% to achieve a green political ideology. (John Lolicato, SSC MDBP 2015)

The balance of benefits and burdens arising from policy change is seen as unfair in this frame because the environmental benefits are understood as meeting an imagined ideal for an urban population whereas the burdens are directly felt in the lives of those who live in the Basin. This storyline contrasts the *productive use* of water for "Australia's future" with water recovery for the environment, which "has caused the population of towns and surrounding farming areas to decline." (Doug Thomas SSCMDBP)

> We who live in the basin are having our lives driven by people who live outside the basin and we resent this. If the government was to conduct a poll of residents who live in the basin the result would be that we do not want our government to take any more water away from productive use. Whether you are an irrigator, grazier, dryland farmer, shopkeeper or any other part of our community we all know that loss of water equals loss of jobs. The irrigation industry industry greatly helps to sustain our local communites [*sic*]. (Glen Price, MDBABPA)

> The city centric bureaucracy has little knowledge of regional communities and even less respect for our hard working food producers. (Helen Dalton, SAMDBRC)

> I think that government office-holders and city dwellers are often guilty of disregarding the rural residents and downplay the importance of sustaining our rural towns. [...] We have a small voice compared to the numbers in the cities. Please do not disregard us!!!! (Name suppressed, NSWSCFPH)

> The Murray Basin Plan remains a document that has been produced by a conglomerate of individuals and organisations most without connection and affinity with the Basin who had no possibility of loosing capital or having their livelihood taken from them. They have produced a plan for the Basin designed to appease the beliefs of a misinformed urban population and the bodies from which their continued funding is most likely to come. (Rand Wilson, SSCMDBP)

The storyline of this regional frame also raises concerns about corporate interests and speculators gaining unfair benefits at the expense of family farmers in ways that parallel the Agricultural frame. Existing market structures "create inequity for farmers in the marketplace and encourage speculation by non-agricultural interests in the trading of water rights" (MDA, MDBWMI) This frame despairs at changes to Australia's perception of farming and the consequences for rural Australia.

> Agriculture is not considered a noble profession in Australia. Agriculture is at the bottom of the food chain; farmers are price takers, not setters [...] and all the infrastructure owned by farmers [has been] stolen and sold to international corporate gobbleopolies which consider food valuable, but only want to pay peanuts for it. (Jeanine Bird, SSCMDBP)

The characterisation of the unfair influence of corporate agriculture is shared by the second regional frame, which is more concerned with the environmental impacts of agricultural water use. While not widely used, the greedy keyword is notable because it appears most strongly in both regional frames and is not broadly taken up by other groups. While the use of speculators in Agricultural had negative connotations, they were recognised as participants in the water market, whereas the sense of greedy here is used in a more general sense related to agricultural water use across the system by classes of actors (see Figure 14). Both regional frames focus on community *wellbeing* and equitable outcomes. These keywords are used by both frames to discuss potential harms and impacts of particular policy options on a region and to argue for water policies that are fair in the sense that they do not disadvantage or cause harm to local communities.

Despite these similarities, the second regional frame has significant parallels with the Environmental frame. It also adopts a storyline of ecological decline and crisis with strong references to ecological communities alongside regional human ones.

> This plan, funded by the people of Australia to remedy problems within the river systems catchment areas has been corrupted by corporate agriculture, politicians, bureaucrats and the management of all things water. [...] The flood plains are a vital part of the river system environment needing flood waters to survive. [...] The New South Wales Government it [*sic*] trying to legalise the practice of Floodplain Harvesting for irrigators to take even more water from the already over extracted river system. (Christopher Rawlins, NSWSCFPH)

> plans should be set to reverse the long-term decline in the extent and quality of Australia's native vegetation, restore the habitat of threatened species, threatened ecological communities, migratory birds and improve the condition of natural resources that underpins the sustainability and productivity of smaller resource based regional areas. (T.S. 'Stan' Dineen, SSCMDBP)

The second regional frame is not anti-agriculture. It contrasts local, small-scale farming with corporate agriculture as part of a storyline that links local farming to environmental protection and corporate farming to environmental exploitation. It links the growing ownership of water and farms by outside interests to declining local communities. This frame highlights the disadvantages faced by small, local farmers and communities who are seen as vulnerable to the power of speculators and commercial agricultural interests in the operation of water markets.

> the current state of the Murray-Darling water market is inequitable, unjust and defective [...] the information asymmetry and imbalance of bargaining powers that exist to the detriment of small-scale regenerative farmers who lack negotiating power to survive in a market of volatile water prices [...] political and commercial interests are distorting a natural resource that, in principle, should be accessible on a needs basis. [...] The health of local communities and geographical environments is directly benefited by farming practices in support of topsoil regeneration, increasing biodiversity, increasing resilience to climate change (Mildura Community Water Bank, MDBWMI)

Discussion of the value of "local knowledge" for policy design and implementation is prominent for both of these regional frames within a storyline that links the incorporation of local knowledge in policy development

to successful outcomes, the delivery of community benefits, and the restoration of community confidence in government management of water policy and the Basin's river systems. This storyline is promoted by local organisations aiming for greater influence over government decision making as well as by local individuals.

> No one will argue that there are not adjustments to be made within the Basin, but these adjustments should not be made in such a way as they take away the livelihood of the people and the communities they support. It is the people of these communities that have a real affinity with the land on which they rely for their livelihood. It is the knowledge of these people that should be used in formulating any such adjustments. (Rand Wilson, SSC MDBABPA)

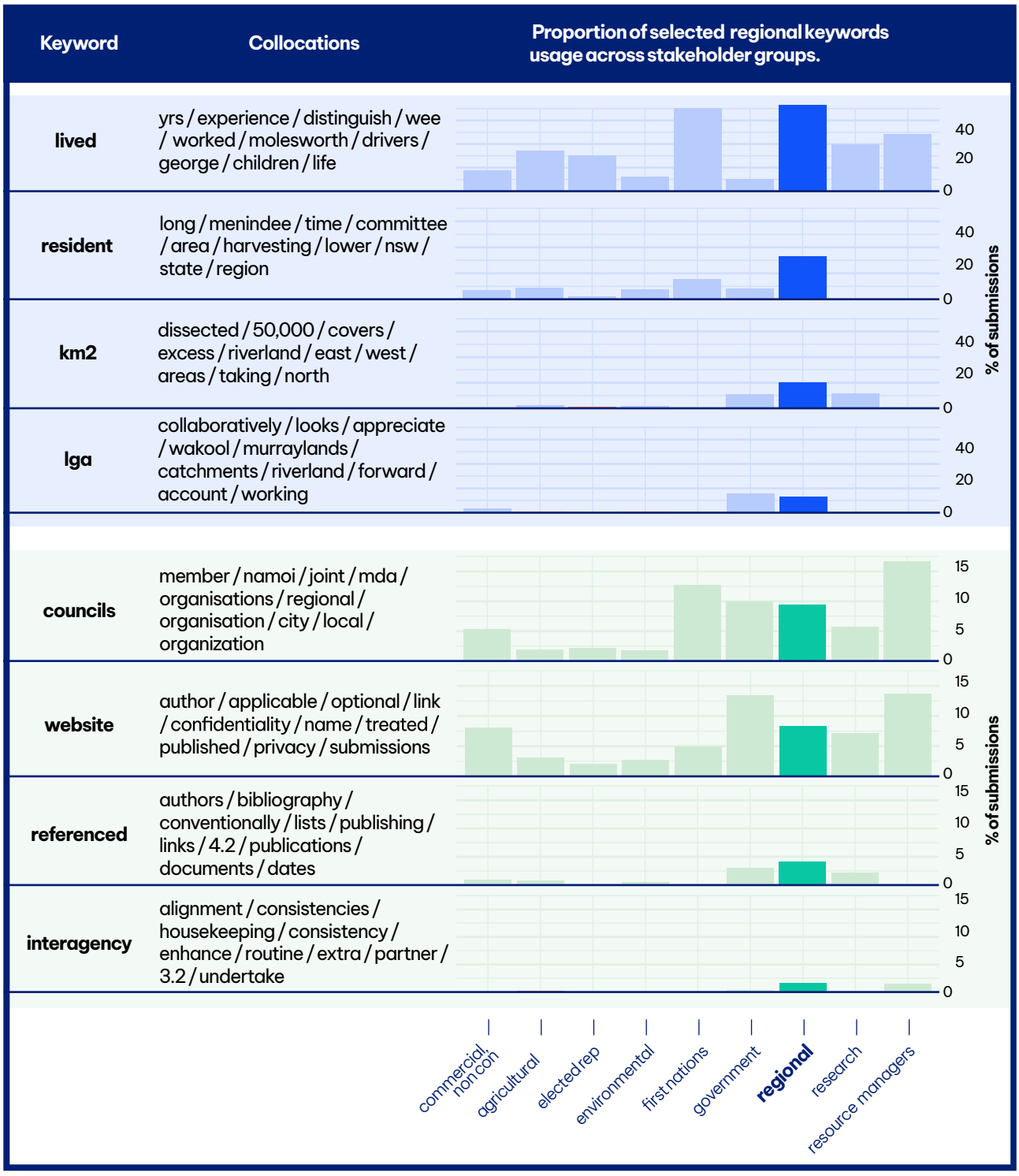

Figure 13: Selected frames and associated keywords for regional stakeholders: submitters establishing either their personal experience of living in an area, or establishment of the demographic facts of the area for organisational submissions; genre of communication by regional institutions in terms of dissemination of information and coordination.

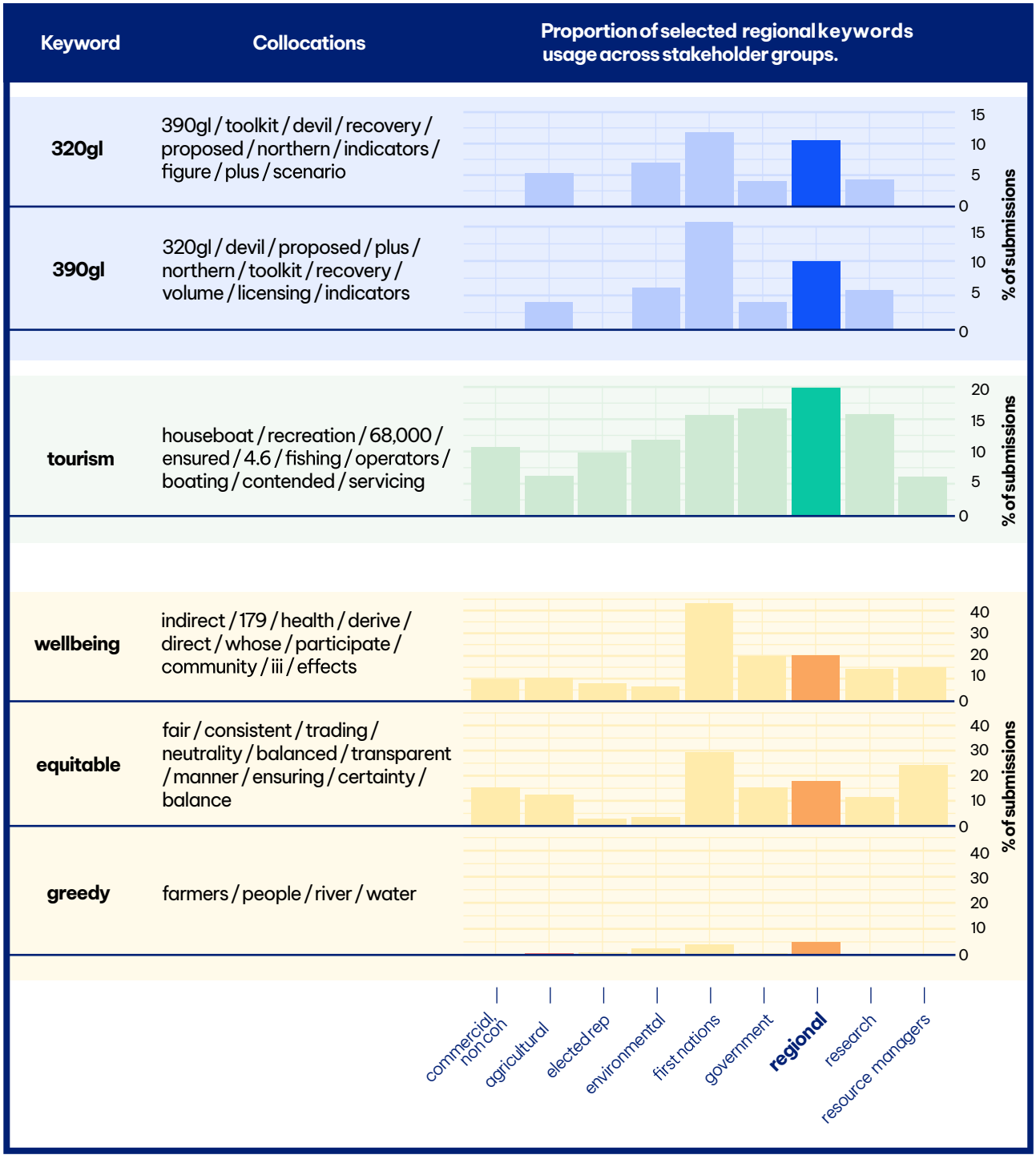

Figure 14: Selected frames and associated keywords for regional stakeholders: direct engagement with the terms of references for an inquiry and water recovery targets; tourism as an opportunity requiring additional management; community wellbeing and fairness.

Commercial, Non-Consumptive

Fairness framing in Commercial, Non-Consumptive Water Market Submissions

Commercial, non-consumptive submissions submissions present a narrow, technical frame focused on water market operations and design. Stakeholders in this group largely support the market-based system but highlight specific areas for improvement, particularly concerning transparency, liquidity, and the role of non-user market participants like speculators. Keywords such as *opaque*, *liquidity*, and *bids* reflect targeted concerns about government interventions and infrastructure operator actions, which are seen to undermine market efficiency. Storylines also address issues of water scarcity, linking drivers of change in supply and demand dynamics, such as climate change and permanent plantings, to rising prices and market risks. Fairness is framed in terms of market rules, with stakeholders calling for greater transparency to address information asymmetries that disadvantage some participants. While concerns overlap with agricultural frames, the commercial, non-consumptive submissions focus more on practical reforms to rebuild trust and ensure fairer market outcomes.

Commercial, non-consumptive submissions focus more narrowly on water markets. This is a narrow frame though which stakeholders comment on market design, rules, dynamics, operations and participants. The keywords and collocates outlined in Table 5 and Figures 15 and 8 show a distinct vocabulary of this group, aiming to improve an existing market-based system that they largely support. This narrow focus provides for a frame much more limited than that found in the four broader frames discussed above.

> the fundamental structures are in place to support the operation of efficient sMDB [*sic*]water markets to meet the needs of water users. However, opportunities exist to implement changes that would result in significant improvements in market efficiency particularly associated with the availability and transparency of market information (Kilter Rural, MDBWMI)

Distinct keywords like *opaque*, *liquidity* and *bids* point to targeted criticism of existing market design and operations, particularly with regard to interventions by governments or infrastrucuture operators, which are seen to compromise the efficient and transparent operation of water markets to the detriment of participants.

> the water market has and continues to operate efficiently, but we would point out that when the Government intervenes in the water market, it is critical that an explanation of planned actions are clearly articulated to the market with clear time frames. Failure to clearly communicate planned actions results in water market confusion and can disadvantage some market participants through both action or inaction predicated on opaque Government intervention. (Australian Water Brokers Association, MDBWMI)

> the opaque disclosures of information by IIO's with respect to rule changes, trading products and lack of transparency for expansions of areas gazetted for irrigation which impacts upon market integrity (Horne Legal, MDBWMI)

Discussion of *liquidity* is largely linked to defences of the role of market participants who are not water users – the *speculators* criticised in many of the Agricultural submissions. In the most common commercial, non-consumptive storyline these market participants increase trading volumes, help with price discovery, enhance market depth, increase competition and market efficiency, absorb risk, and lower transaction costs for water users.

> non-users are often an important contributor to increased market liquidity [...] This can improve competition within the market, as well as enhance the process of price discovery [...] speculators provide liquidity and reduce market volatility, providing a benefit to the other market participants that produce or consume commodities [...] non-users can provide a "valuable social service" in markets, by enhancing liquidity and price discovery, allowing rights to be used as collateral to fund investments, and ensuring future use value is accounted for. (NERA Economic Consulting, MDBAWMI)

A number of submissions in this group discuss the implications of water *scarcity*. These storylines highlight risks to the market from changing supply and demand profiles for water. Narratives link supply side shifts (e.g. climate change's influence on declining inflows and increased risk of drought) with demand side changes (e.g. increases in high-value permanent plantings) to explain changes in market dynamics and highlight market risks associated with scarcity (water price rises, price volatility growing bid/offer spreads). For some submissions, this narrative extends to concerns about further water recovery for the environment.

> The water scarcity created by the buybacks and water ownership by pure water holders, combined with increased demand from new 'high yield' industries [...point...] towards increased water scarcity, and increased prices / price volatility [...] there should be no additional water to be taken out of the system until the trading rules now in place are fixed [...] to deal with increasing water scarcity. (Bonlac, SSCMDBP)

Fairness concepts arise in these storylines attached to consideration of specific market rules and other aspects of market operation. For example, a lack of transparency of information about market trades and resulting information asymmetries between market participants is a key area where fairness is raised as a justification for further reform. Several storylines explicitly a link lack of transparency and access to data with unfair outcomes for water users that lead to a lack of trust in governments and the water markets. There are parallels here with Agricultural frames. However, most storylines in the commercial, non-consumptive group contain suggestions for practical changes that could be made to market design or government policy to rebuild trust.

Table 12: Fairness collocates, commercial non-consumptive submissions

Theme	Fairness collocates
Market participants (or impacted by markets)	farmers, customers, consumer, community, communities, regional, rural
Market design	exchange, trading, operation, access, activity, rules, ivt, advantage, settings, papers, efficient, impacting, system, constraints, legal, law

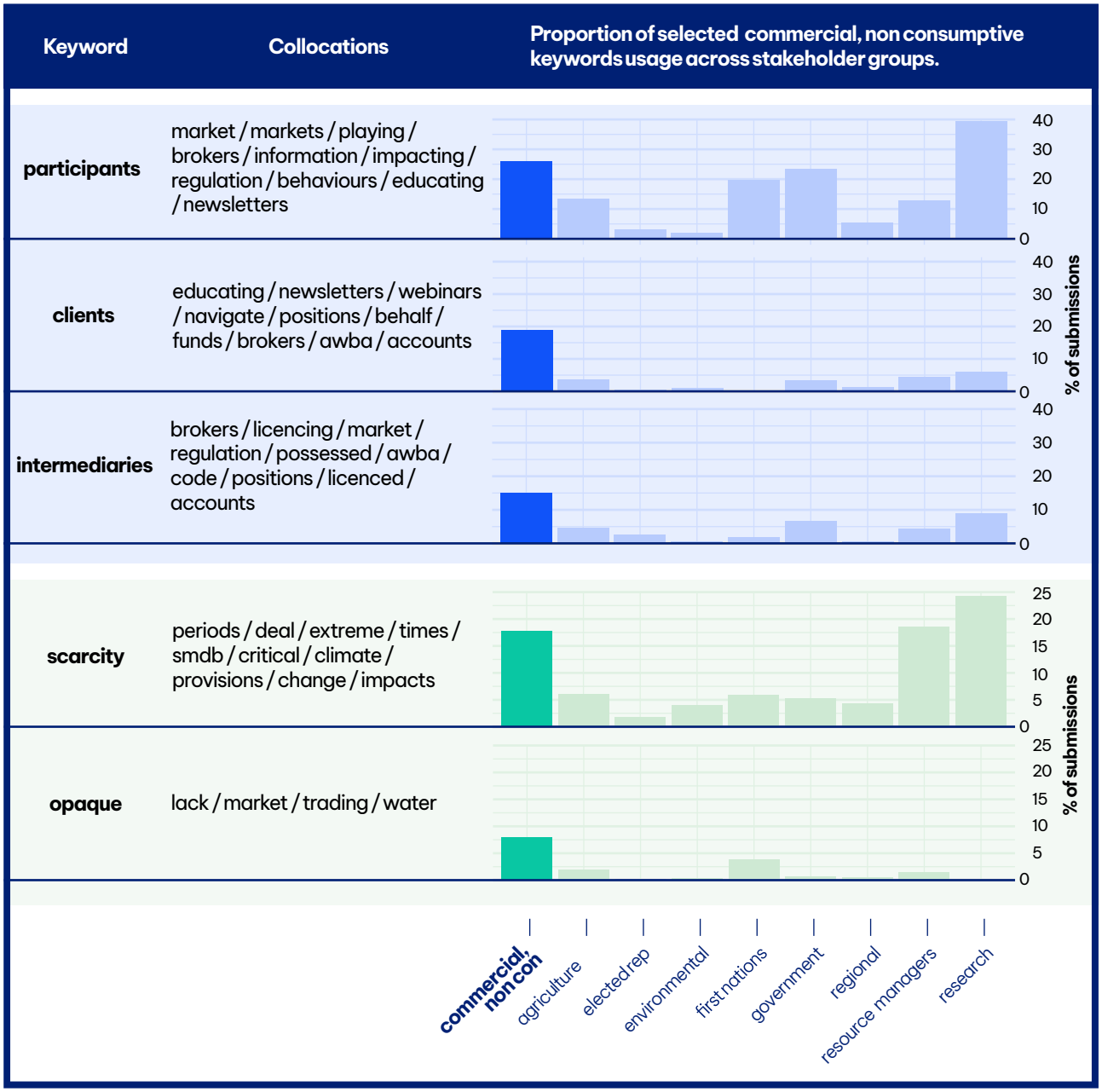

Figure 15: Selected frames and associated keywords for commercial, non-consumptive stakeholders: how they are situated within and interact with their clients and other participants in the water market; the operation of the water market as managing scarcity into the future, and the impact of opaque policy decisions and water market rules as barriers to this.

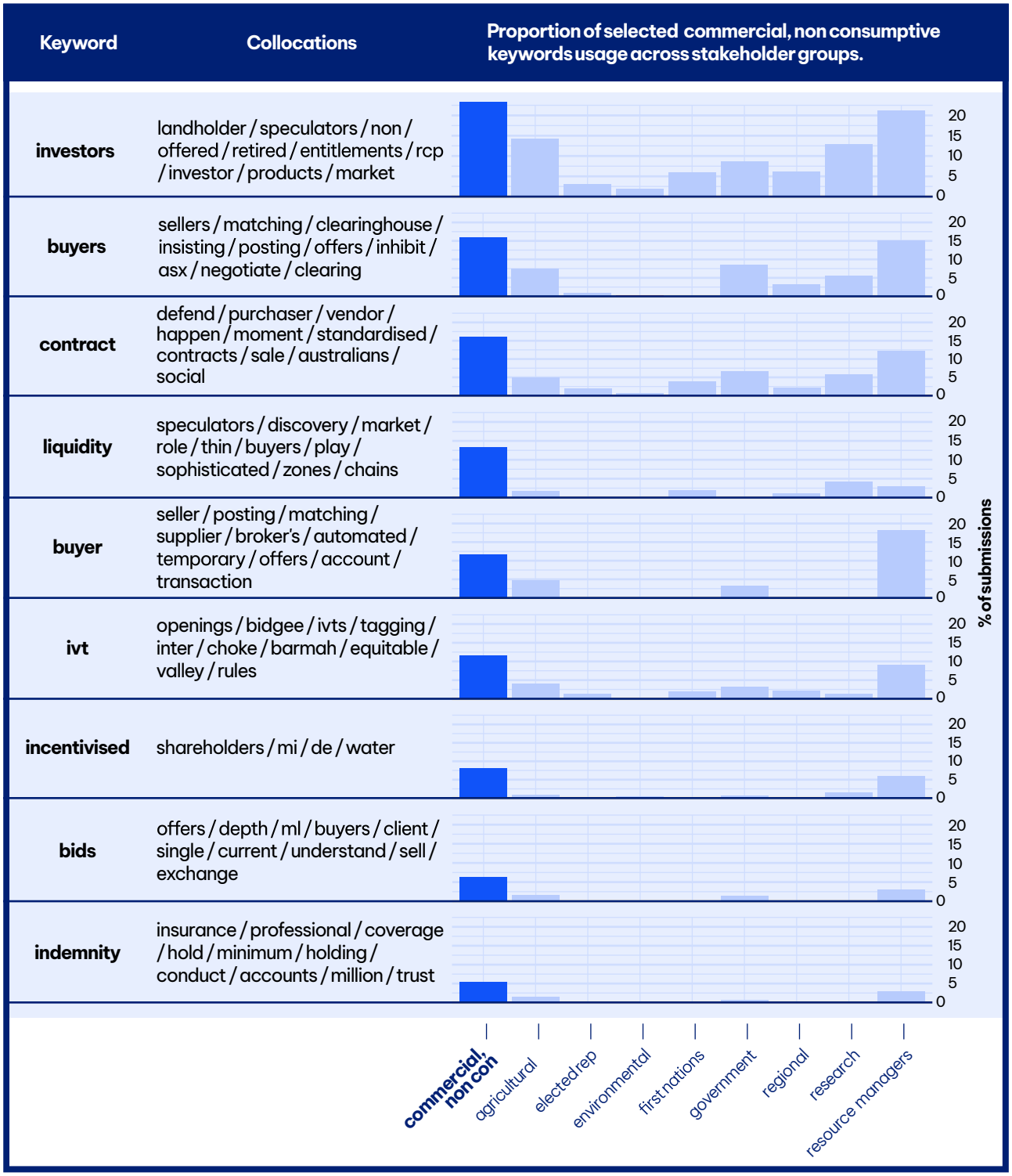

Figure 16: Selected frames and associated keywords for commercial, non-consumptive stakeholders: detailed engagement with the specifics of the operation of the water market as a given.

Resource Managers

Fairness framing fairness in resource manager submissions

Resource management submissions employ a narrow frame centered on the operation of water utilities and infrastructure, with little engagement beyond these technical aspects. The majority of submissions, particularly those to the Productivity Commission inquiry into National Water Reform, focus on servicing customers, managing infrastructure, and responding to external events like the COVID-19 pandemic. Fairness concepts are rarely invoked, with the term "equitable" appearing solely in relation to service provision and Inter Valley Trade (IVT). These submissions reflect a utilitarian approach, prioritising efficiency and operational stability over broader social or environmental narratives.

Resource management submissions primarily focus on the operation of water utilities and related infrastructure. This is again a narrow frame. We could find no broader frame in these submissions. We suspect this is partly because 21 out of 33 of these submissions were to the Productivity Commission inquiry into National Water Reform. There is only sparse engagement from resource managers spread across the other inquiries we included in our corpus. This is the only frame that does not include the word *environmental* in its top 20 most frequent words used and it occupies its own branch in the dendrogram showing the results of the cosine similarity analysis (see Figure 5. The narrowness and differences of this frame is demonstrated through the keywords focusing on specific infrastructure (*utilities*, *stormwater*, *wastewater* and *potable*, figure 17) and an overwhelming focus on *customers* as end users (also Figure 17).

Additionally, we note the keywords *covid* and *pandemic* (figure 17) as an example of how inquiries can be impacted by events. Because the inquiry that received the majority of submissions from this stakeholder group was conducted during 2020 and the early stages of the Covid-19 pandemic, it appears as a major focus for this group. Their responses typically focus on the pandemic as either one situation among many that resource managers need to be prepared for (for example - bushfires), or also as an area requiring particular supports and policy in the context of recovery from the pandemic.

The use of fairness concepts in the resource manager submissions is very limited. The majority of the fairness concept terms are not used at all. The primary use is the word "equitable", presented exclusively in the context of service provision or discussion of Intervalley Trade (IVT) as in the following quotes.

> As part of the new NWI, the PC should consider initiating the development of an alternative approach to transparently reflecting community values in the bulk allocation of water for social, environmental and economic objectives, which would overhaul the awkward combination of market mechanisms and ad hoc restrictions and interventions that is currently in place.The principles for an alternative approach (which could also apply to supply augmentation) include:
>
> - the equitable and efficient use of all water
> - equitable security of supply for all domestic water customers, as far as practicable, across variable hydrological conditions and accommodating climate variability and change. (VicWater, PCNWR)

> More clarity could be provided around the operating rules and some issues such as the Inter Valley Trade. The IVT transfer process needs to be more equitable to all market participants through mechanisms such as a ballot and the IVT limits and claimed environmental damage need to be clarified as to whether they are real physical limits or merely barriers to trade. (Central Irrigation Trust, MDBWMI)

These uses of "equitable" closely match the language used in existing legislation and provide no further

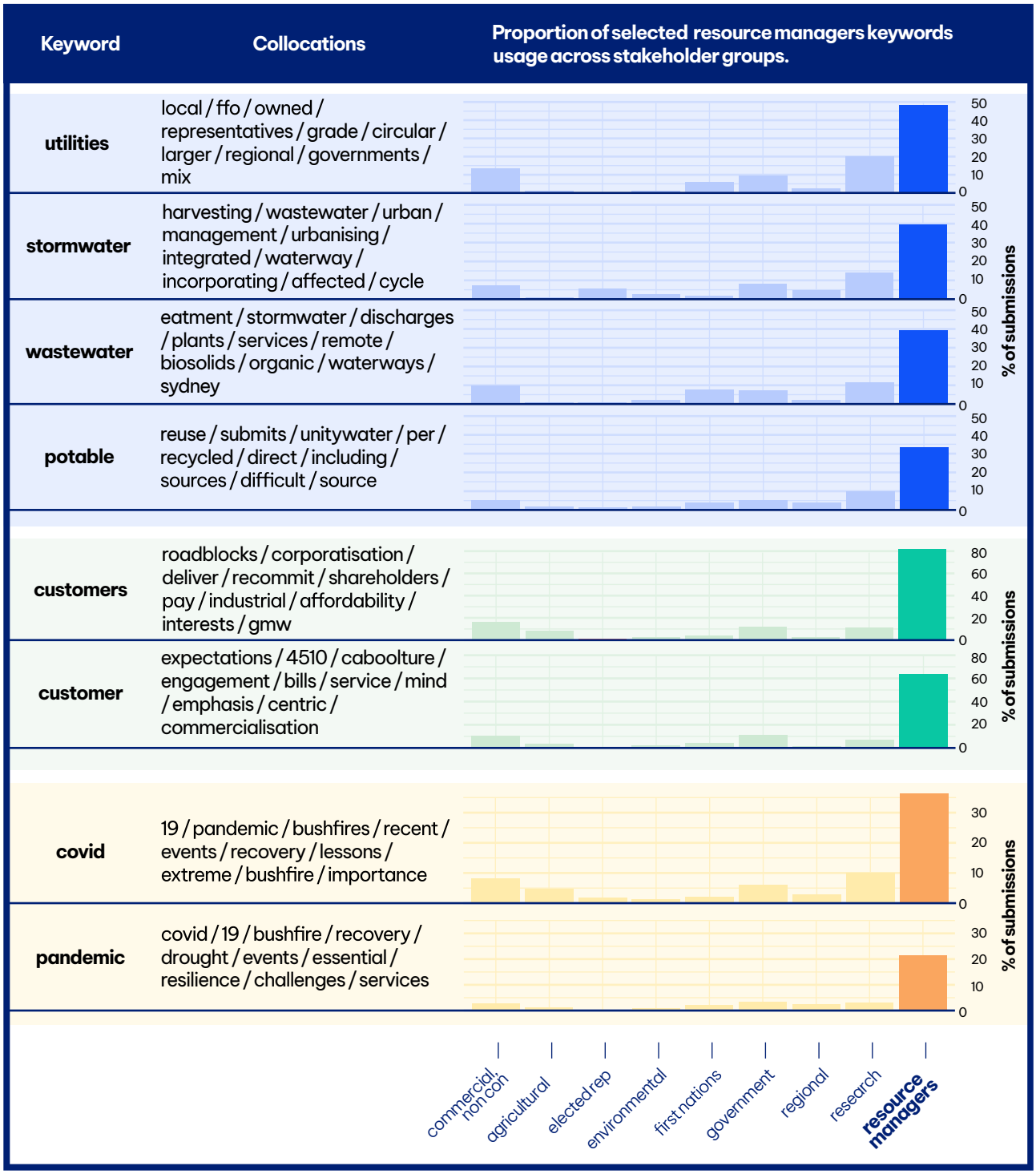

Figure 17: Selected frames and associated keywords for resource managers: operation of particularly urban water infrastructure; servicing customers as the primary end user; the impacts of circumstances and timing on the content of submissions to an inquiry during the start of the COVID-19 pandemic.

definition of the terms for decision makers (see also the results of our legal study, which found a similar lack of definition across the legislation and other sources examined).[13]

Fairness concept words are used too infrequently in this group for the fairness collocates tables to be useful and we have not included them.

Research

Fairness framing in research submissions

Research submissions in water policy inquiries represent a distinct genre, shaped by academic language and disciplinary expectations. Unlike other groups, research submissions do not adopt a single overarching frame or represent a single perspective. While many research submissions align with frames used by other groups, such as the crisis narrative in ecological research, the diversity of topics and perspectives included here confirms that our coding of research submissions has captured a genre rather than a single interest group. Topic modelling reveals that research submissions span a wide range of issues, addressing both ecological risks and technical market operations. Further analysis of individual submissions would be required to link individual submissions with particular interest groups.

Submissions from researchers were a distinctly different genre from other groups evidenced by the distinct keyword vocabulary and collocations dominated by terms associated with an academic genre. A single overall framing of research submissions is difficult to discern. Likely reasons for this are:

- the dominance of the stylistic features of published academic research literature (see discussion below)
- "research" is a characteristic of submission authors amenable to coding, but it does **not** represent a single stakeholder position.

Closer reading of individual submissions suggests that individual authors do adopt framing similar to that used by other stakeholder groups. However, the range of views found in the research submissions means no single frame is adopted by authors from this group. The breakdown of research submissions into further groupings to match the major frames identified in this study is beyond the scope of our current work. However, it is a line of inquiry that could be usefully pursued.

To test this conclusion, we applied topic modelling to the research submissions using Latent Dirichlet Allocation (LDA) to identify topics in the text (see Table 13). Topic modelling breaks the text into different topics based on the words that tend to appear together. The results of the topic modelling suggest that research submissions cover a wide range of topics related to the terms of reference to the inquiries included in the sample.

Table 13: Topic model results

Topic	Key terms
Policy and management	water, environmental, plan, australia, management, indigenous, national, report, nwi, northern
Economics and infrastructure	water, economic, infrastructure, use, communities, farm, irrigation, government, 2020, market
Rivers and ecology	river, murray, water, flow, floodplain, fish, management, flows, environmental, rivers

Identifying fairness collocates provides little in the way of further information on the frames used in research submissions. However, the list of names collocated with fairness terms in the research submissions suggests many submissions made to more recent inquiries were made by researchers working in the water justice field.

In general, research submissions aimed to mobilise their particular disciplinary expertise to respond to the

Table 14: Fairness collocates, research submissions

Theme	Fairness collocates
Governance	governance, law, indigenous, council, labor's, plan, management, protocol, system
Researchers	langton, jackson, grafton, hartwig, quentin, hub, publish, o'donnell
Markets	markets, businesses, losses, capital

terms of reference for each inquiry. Broadly, this means that many of the identified keywords for research submissions could be better described as citations to prominent researchers working in the area - almost half of the total keywords in Table 5 are names. The near ubiquitous author-date format for in text citations elevates authors of key literature to stand in for the disciplinary knowledge researchers wanted to highlight to government (as can be seen in Table 5). It also suggests a certain insularity in the work of this group of stakeholders. The particular structure of academic journal titles also became prevalent keywords, particular the keywords *journal* and *australasian* (Figure 18). Examining which journals were cited using the journal keyword shows submissions in this category were drawing on the academic literature in law, economics, social welfare, hydrological and systems modelling, ecological monitoring, ecology and biology. Many submissions assigned to the First Nations's group also drew heavily on particular parts of the academic literature.

Ecological research submissions provide an example of how a subset of research submissions adopts a framing narrative similar to that used by another stakeholder groups. A number of these submissions make use of a crisis frame similar to that found in the Environmental submissions. They add specific research literature highlighting environmental risks and impacts to this frame through the keywords *mortality*, *stressors*, and *biota* (Figure 19). These submissions use citations of particular research literature to explain particular ecological structures and processes with water systems, and outline the potential risks and importance of water management decisions to address the *crisis* faced by the Basin's ecosystems. While this subset of research submissions includes reference to ecological crises and the *climate crisis* they also refer to "a crisis of trust and deficiencies and failures in governance." (IWF, PCNWR)

Other keywords were related to the practice of research or research tools (e.g. *linear* as in *linear* relationship and *scales* as in spatial *scales*). The use of *sensing* and *landsat* largely occurs in the context of research commentary on the use of remote sensing technology as a tool for monitoring of water use and ecological change. This was a common thread that aligns with Commercial, Non-Consumptive calls for improving transparency in the management of water - particularly with calls to be able to account for water use across the Basin. *Decentralised* appears as a positive modifier to describe modes of participation with stakeholders and the decision-making of participants in the water market (Figure 19).

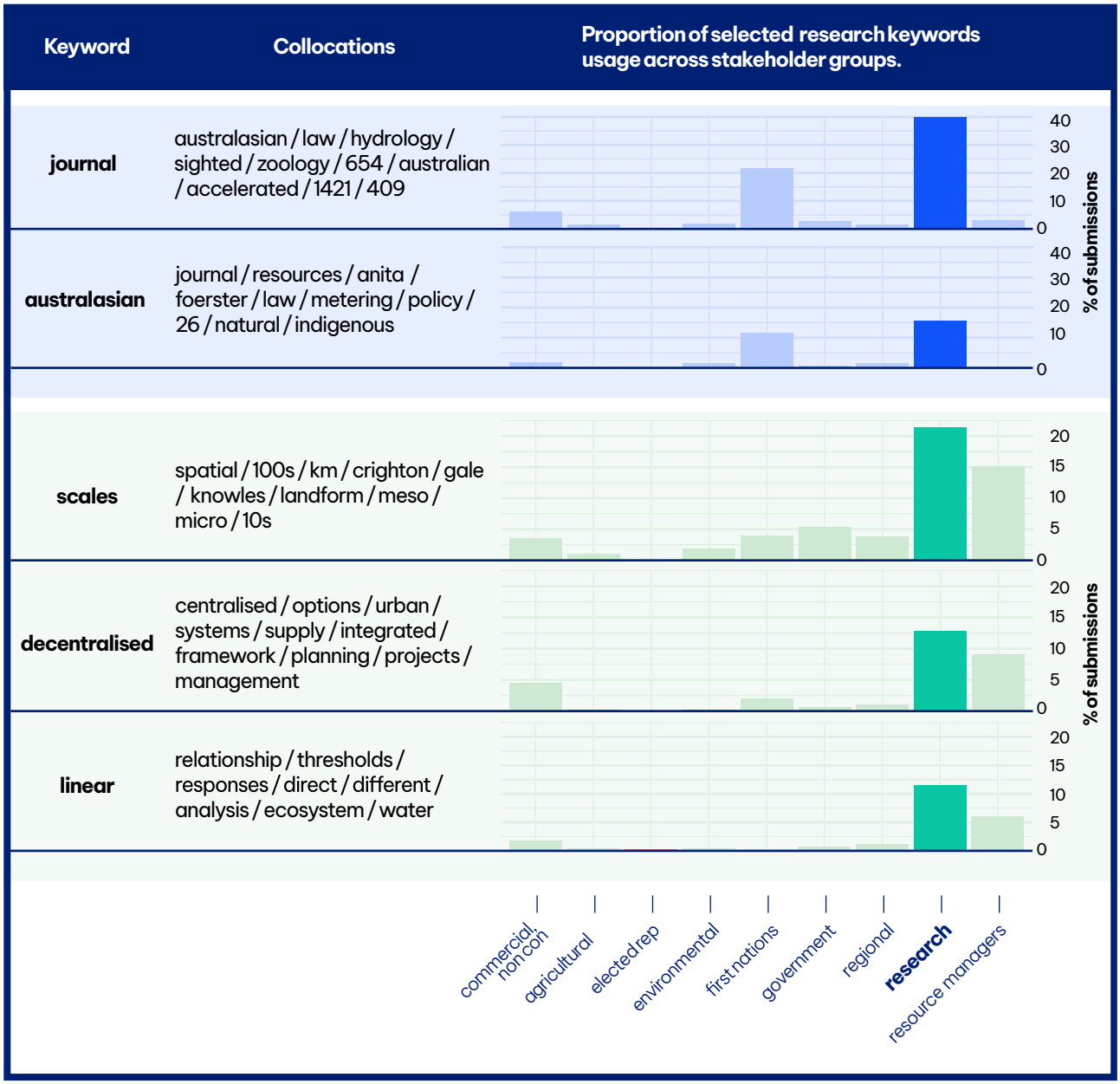

Figure 18: Selected frames and associated keywords for research stakeholders: genre of academic writing including citation of particularly regional journals; keywords for measurement, modelling and the operation of markets.

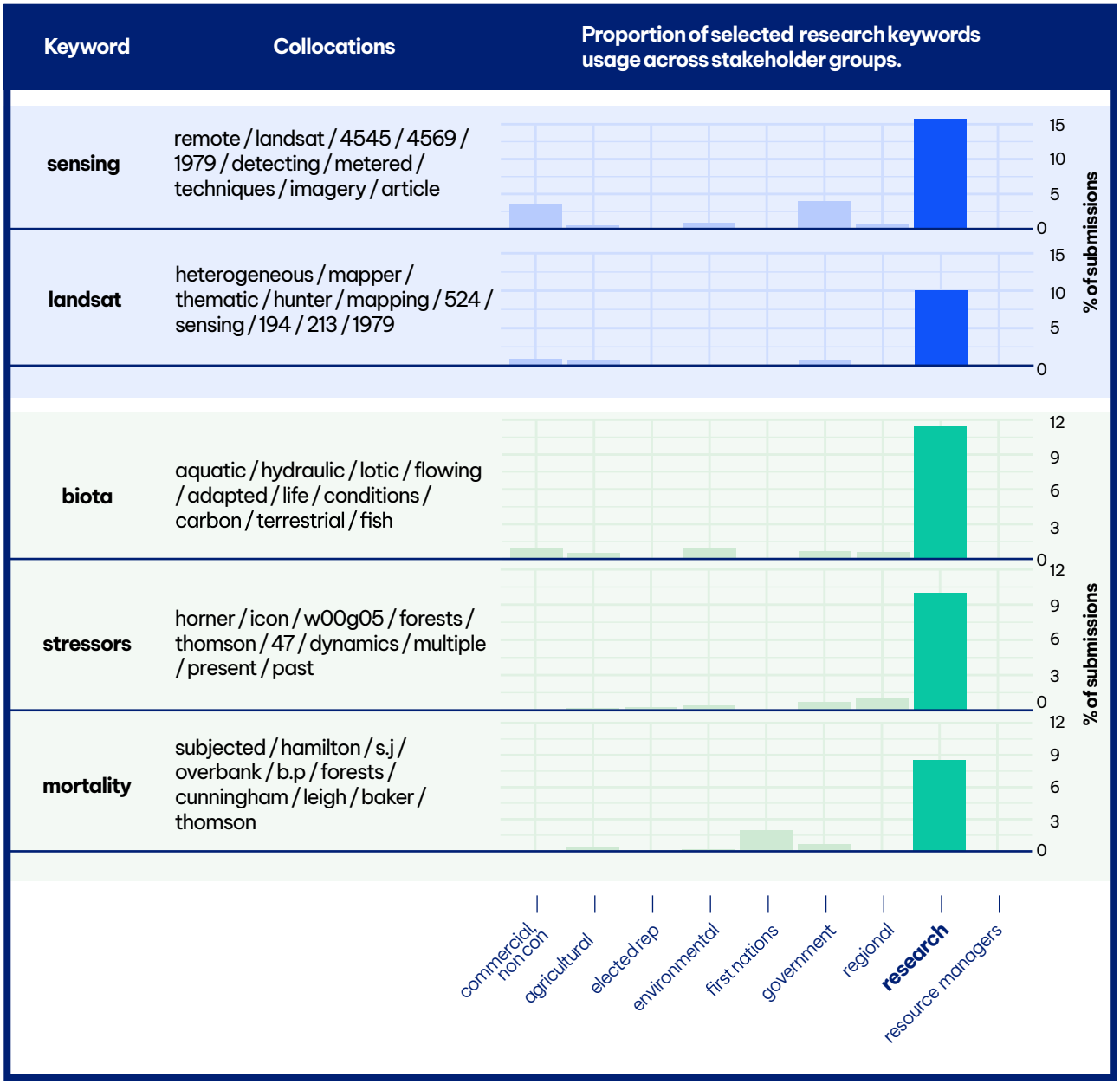

Figure 19: Selected frames and associated keywords for research stakeholders: technological approaches for monitoring and evaluation of water use across the system; ecological impacts of water policy on the environment.

Government

Fairness framing in government submissions

Government submissions are characterised by a bureaucratic genre that emphasises policy development and implementation in abstract terms, often detached from the substantive issues raised by other stakeholders. The keywords and collocates used in these submissions, while consistent across different inquiries, could apply to nearly any policy domain. Fairness concepts, such as *equitable*, appear infrequently and are used without substantive narrative development. Government submissions generally focus on ensuring transparent, equitable water management for current and future generations but lack the detailed framing storylines found in other stakeholder groups.

While government submissions engage with many issues (and government agencies are the most consistent groups to make submissions across our inquiries), the distinctive keywords of government submissions enact a particular kind of bureaucratic genre (Figure 20). This genre is often limited to abstracted configurations of policy development and implementation, and less directly on the substantive issues articulated by other stakeholder groups. Indeed, the majority of the keywords and collocates could come from almost any policy domain.

The primary fairness concept word used by government submissions is *equitable* and this only appears in a small number of submissions. Like the resource managers similar use of the term government submissions provide little in the way of framing storylines to help with further definition. For example,

> The plan will deliver on the state's responsibility to ensure we have an equitable and transparent approach to the management of water for current and future generations. (NSW Government, SAMDBRC)

> The Basin Plan was made in November 2012 and at its heart is the need to ensure water is shared between all users in an equitable and sustainable way. (Murray-Darling Basin Authority, SSCMDBP)

One of the few substantive keywords for this group, *sewerage* (see Figure 5), shows some overlap and shared interest between government submissions and Resource Managers. Indeed, some of the government organisations are also resource managers, highlighting the challenge of making clear distinctions between the groups in our annotation scheme.

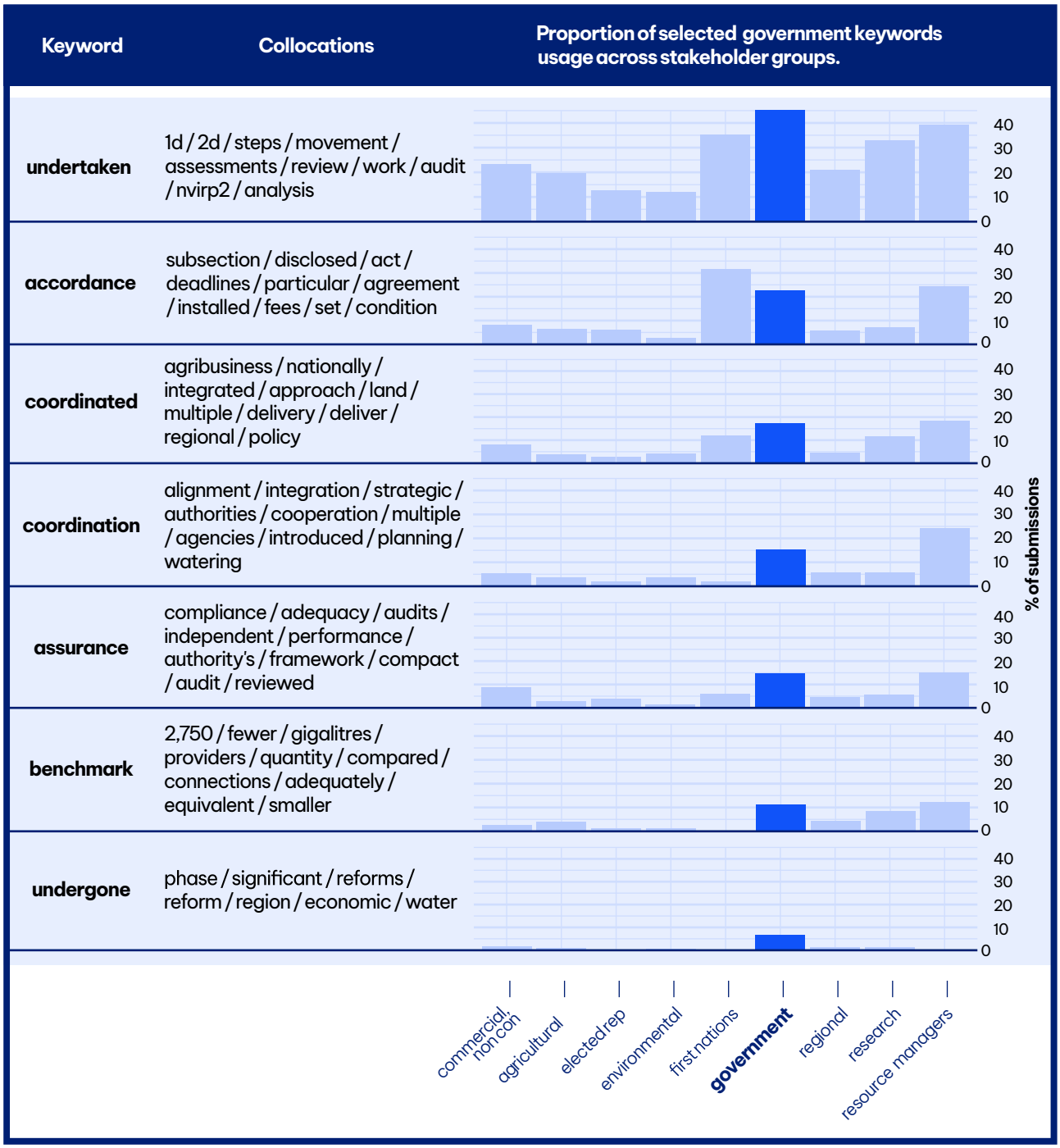

Figure 20: Selected frames and associated keywords for government stakeholders: discussion of government engagement, coordination and implementation at the policy level, focusing on an abstracted view of the water system.

Elected Representatives

Fairness framing in elected representatives' submissions

Elected representatives' speeches in Federal Parliament reflect a wide range of views, corresponding to the diverse constituencies they represent. Fairness is a common theme, though it aligns with the specific concerns of different groups. Environmental representatives often frame fairness in terms of returning water to the environment, critiquing excessive water use by certain sectors. In contrast, agricultural and regional representatives emphasise the unfair burdens placed on farmers and rural communities by water recovery targets, framing them as arbitrary and harmful. Other representatives focus on ensuring transparency and equity in water markets, addressing concerns about market concentration and regional inequalities. These speeches illustrate how parliamentary discourse parallels the advocacy frames found in water policy submissions.

Comparing elected representatives' speeches in Federal Parliament to written submissions is complicated by the differences between speech and writing. Even after removing many keywords related to the genre of Parliamentary speeches in the first pass of analysis, we are still left with keywords that represent the procedures of speaking in Federal Parliament rather than the substantive issues that we are interested in.

The set of keywords that emerge: *overallocation1500*, *2700*, *450*, and the unit *gigalitres* (Figure 21) show that in elected representatives' speeches there is a primary focus on the headline system-wide figures of the Basin Plan. More than half of the speeches use the unit gigalitres, indicating an abstracted view of the overall system through an annualised volume of water.

Fairness concepts are used by the elected representatives group. However, given this group represents a wide range of constituencies we would expect to see a similar range of views expressed rather than a single common frame. This is what we find with this group's use of fairness concepts: it tends to match the frames shared with their key constituencies. Despite the differences in genre, there are clear parallels between the frames of other submissions groups and those used by elected representatives in their Parliamentary speeches. We provide some examples below to illustrate the parallels with the broad frames used by the submission groups analysed above.

Senator Sarah-Hanson Young of the Greens uses an environmental frame similar to the one described in Environmental above in many of her speeches about water management in the Basin. She employs a clear crisis storyline embedded within the broader environmental frame that claims not enough water is allocated to the environment. Fairness requires returning more water to the environment from those "who have been too greedy". The trope of *greedy irrigators* is also prominent in Environmental storylines.

> Despite the fact that scientists are telling us we drastically have to manage our water system better, that we need more water allocated to the environment and that we have to give the river back its fair share, there are no guarantees that any of this amount will actually be returned to the river anywhere before 2024 – far too late to really save the system. It has been very disappointing to see how both the government and the coalition have worked together on delivering such a pathetic plan. It does not set the river up for a healthy future. This bill before us does not even have strong enough environmental protections. (Sen. Sarah Hanson-Young, Hansard)

> This is a system that desperately needs more water returned from those who have been too greedy, who have taken more than their fair share. It needs to be returned to the river so that everyone has an opportunity to rely on a healthy system into the future. (Sen. Sarah Hanson-Young, Hansard)

Senator Barnaby Joyce, David Littleproud MP and Senator Janet Rice use many of the elements from the agricultural and regional frames. They both draw on the storyline of farmers being unfairly burdened by water

recovery. Joyce has a particular focus on the consequential impacts on regional communities when water is no longer available for the irrigation industry. He frames the water recovery targets as "arbitrary" to emphasise the procedural unfairness of the way water is being recovered. Littleproud evokes the "fair go" and to compares the burdens the people of the Basin shoulder to meet the "ideological whim" of urban Australians whose lives and incomes do not directly depend on access to water. Senator Rice builds concerns about the oligopolistic behaviour of water traders into her storyline and sees a remedy in government action to make the water market fairer through increased transparency.

> as they go about this sort of arbitrary purchase of water licences here and there, they put at threat the communities which those water licences are built around. There is a serious concern – not so much for the people who get to sell their water licences but for the people who live in the fibre and iron or the weatherboard and iron who are left behind in the regional towns after the water licences go. What exactly do they do? There is nothing in this policy about the Labor Party's plan for a fair and equitable outcome for the working families who are left behind by Labor's arbitrary decision-making process. Nothing happens there. What happens if the people of Dirranbandi, St George or Bourke lose their water licences? (Sen. Barnaby Joyce, Hansard)

> Don't you think that the hurt that you've inflicted already is enough? Don't you think that we deserve a fair go? Don't you think that regional Australians, those in the Basin, should have the same opportunity to get up in the morning , make a living and be given the tools to be able to do it and not have them taken away because of some ideological whim? That's not the Australian way. (David Littleproud MP, Hansard)

> Worse, under conditions of water stress and drought, when water is scarce and farmers are desperate, there is always the potential for the formation of large oligopolies and exploitative behaviour by water traders. Market concentration is a very real threat. The flow-on of this concentration into food, fodder and fibre prices could have very large impacts for our rural communities. So it is through measures such as the one in this bill that we are going to be able to ensure that our water-trading system remains as equitable, transparent and fair as possible. I want to clarify here that, although the Greens remain cautious about the role of foreign investment in Australia's water, we are equally cautious about domestic investments. (Sen. Janet Rice, Hansard)

Helen Haines MP brings out one of the key concerns visible in the regional frame that exploits regional differences for political gain – here the perceived unfair burden experienced by water users in the southern Basin compared with the north.

> Many farmers and other stakeholders across Indi and across Victoria feel that the southern basin is shouldering an unfair share of the burden when it comes to purchasing water entitlements by government. (Helen Haines MP, Hansard)

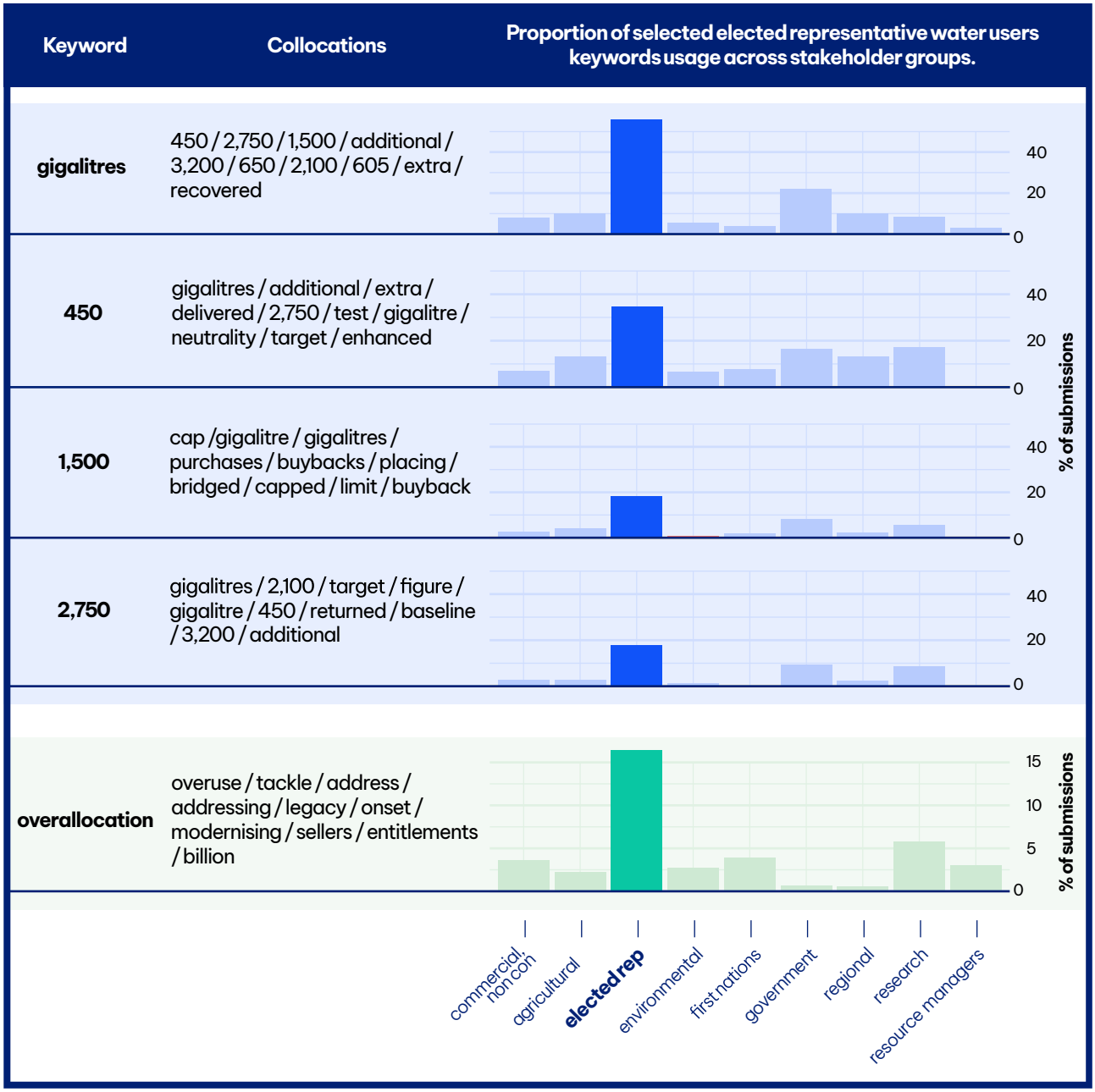

Figure 21: Selected frames and associated keywords for elected representatives: the Murray-Darling Basin Plan and water policy as a set of system-wide annual flows and targets; overallocation of water policy as a policy failure to be addressed.

Topic modelling results

In total across all inquiries and elected representative speeches we included 2271 documents in the analysis (see Summary of Included Submissions by Groups for a more detailed breakdown). The results of running LDA to produce 30 topics are shown in Table 15 along with any strongly associated fairness terms. Section Submitters of Highest Weighted Documents for Each Topic includes the same table and the associated submitters of the top weighted documents for each topic. The detailed association of specific fairness terms and each topic are illustrated along with a hierarchical clustering and grouping of topics in Figure 22.

Table 15: Topics identified using LDA. Topics are arranged in descending order of estimated prevalence. The indicated words are arranged in descending order of estimated weight for that topic. Fairness terms indicate for which topics the indicated equity, fairness and justice terms are weighted more highly.

Rank	Prevalence (%)	Twenty Highest Weighted Words	Fairness Terms
1	9.8	people, can, years, now, need, us, just, time, like, environment, many, drought, see, one, system, get, food, land, farmers, much	fair
2	7.9	bill, people, government, communities, minister, south, gigalitres, just, going, senator, can, australia, know, system, get, think, want, one, said, time	fair
3	7.1	environment, northern, wetlands, environmental, important, needs, species, flows, ecosystems, gl, cultural, values, reduce, returned, available, reduction, proposal, impacts, significant, protect	
4	5.0	irrigation, farmers, communities, production, farm, irrigators, economic, food, industry, agriculture, dairy, agricultural, irrigated, environment, environmental, australia, productive, infrastructure, impact, regional	fair
5	4.8	environmental, management, outcomes, communities, impacts, economic, community, implementation, environment, use, social, including, long, objectives, need, term, system, resources, benefits, needs	
6	4.3	local, submission, council, community, communities, government, region, committee, association, economic, shire, box, regional, social, opportunity, australia, members, po, cotton, industry	fair
7	3.8	irrigation, many, much, environmental, policy, political, australia, even, issues, mdb, made, one, case, can, issue, way, system, point, like, based	equity
8	3.7	government, national, south, state, australia, commonwealth, states, new, australian, bill, commission, climate, governments, agreement, change, australia's, reform, authority, minister, drought	
9	3.7	recovery, northern, environmental, mdba, proposed, review, measures, outcomes, communities, amendments, economic, target, authority, reduction, impacts, gl, queensland, flow, toolkit, changes	
10	3.5	floodplain, harvesting, nsw, take, fph, farm, 2021, must, management, flood, rainfall, rivers, downstream, regulation, limits, rules, licence, government, northern, within	fair
11	3.4	market, allocation, trade, trading, price, prices, irrigators, entitlement, markets, use, can, carryover, entitlements, available, demand, temporary, victorian, allocations, time, information	
12	3.1	nwi, national, reform, commission, productivity, report, management, draft, planning, climate, 2020, governments, government, infrastructure, submission, advice, framework, change, policy, outcomes	
13	3.1	market, markets, information, trade, accc, report, trading, data, interim, participants, regulation, state, transparency, options, rules, trades, inquiry, including, states, brokers	fair

Table 15: Topics identified using LDA. Topics are arranged in descending order of estimated prevalence. The indicated words are arranged in descending order of estimated weight for that topic. Fairness terms indicate for which topics the indicated equity, fairness and justice terms are weighted more highly.

Rank	Prevalence (%)	Twenty Highest Weighted Words	Fairness Terms
14	3.0	environmental, projects, recovery, outcomes, commonwealth, adjustment, measures, sdl, gl, efficiency, government, sustainable, implementation, south, project, additional, infrastructure, program, diversion, also	
15	3.0	lakes, coorong, lake, lower, mouth, south, system, barrages, flows, drought, sea, salinity, levels, alexandrina, fresh, salt, sa, region, albert, australia	
16	2.7	mdba, flows, flood, constraints, goulburn, flow, flooding, environmental, impacts, day, strategy, property, proposed, high, management, report, risks, landholders, private, major	
17	2.6	act, environmental, commission, sustainable, royal, resources, mdba, resource, section, 2007, economic, use, relevant, may, submission, commonwealth, must, take, management, south	
18	2.5	security, nsw, entitlements, allocation, irrigation, entitlement, general, use, high, valley, users, nswic, murrumbidgee, system, allocations, southern, holders, rules, sharing, reliability	equitable, inequitable
19	2.5	urban, services, supply, infrastructure, planning, regional, service, quality, local, government, national, drinking, can, utilities, new, cost, funding, health, communities, investment	
20	2.4	bill, 2023, rivers, amendment, restoring, provisions, buybacks, recovery, projects, environmental, environment, 450, deliver, communities, 450gl, outcomes, gl, proposed, government, measures	
21	2.3	flows, barwon, menindee, flow, northern, nsw, lakes, lower, years, extraction, system, low, bourke, sharing, environmental, downstream, mdba, class, irrigators, extractions	
22	2.2	macquarie, marshes, environmental, flows, floodplain, area, irrigation, wetland, mdba, flow, system, industry, nsw, grazing, landholders, flood, red, redacted, warren, valley	
23	2.2	indigenous, aboriginal, nations, cultural, first, rights, people, traditional, peoples, land, communities, access, country, interests, northern, owners, management, nt, native, development	justice, equitable
24	1.8	report, australia, 2018, australian, 2019, review, change, 2017, climate, et, al, research, 2020, modelling, department, analysis, 2016, commission, available, 12	
25	1.8	groundwater, gas, industry, use, soil, coal, quality, well, resources, can, queensland, mining, energy, australia, surface, used, western, new, associated, aquifer	
26	1.8	nsw, compliance, metering, information, access, management, take, licence, department, meters, government, sharing, environmental, can, plans, industry, public, 2018, users, consultation	equitable
27	1.7	land, irrigation, foreign, rural, family, investment, ownership, scheme, owned, register, security, management, infrastructure, public, new, farms, access, mi, government, hill	
28	1.7	dam, release, said, 2015, government, griffith, farmers, 15, nsw, australia, per, mg, murrumbidgee, september, drought, history, million, year, burrinjuck, australian	

Table 15: Topics identified using LDA. Topics are arranged in descending order of estimated prevalence. The indicated words are arranged in descending order of estimated weight for that topic. Fairness terms indicate for which topics the indicated equity, fairness and justice terms are weighted more highly.

Rank	Prevalence (%)	Twenty Highest Weighted Words	Fairness Terms
29	1.4	flow, fish, rivers, flows, management, species, floodplain, et, ecological, al, freshwater, research, natural, habitats, australia, habitat, wetlands, environmental, aquatic, large	
30	1.4	gl, storage, total, average, year, dam, capacity, 100, data, figure, page, flow, storages, inflows, annual, use, rainfall, system, 200, level	

The most prevalent topics (topics 1 and 2) and some other topics (topic 24) can be associated with residual genres rather than specific content - these indicate the features of submissions to an inquiry (topic 1), speeches in parliament (topic 2), or the technical genre of submissions from researchers and some organisations (topic 24).

Some topics can be associated with terms of reference for particular inquiries: topics 10, 12 and 20 align with the NSW Select Committee on Floodplain Harvesting, the Productivity Commission National Water Reform inquiry and the Inquiry into the Water Amendment (Restoring Our Rivers) Bill respectively.

Other topics align directly with specific groups of submitters - topic 23 represents either submissions by or references to First Nations issues in water policy, while topic 6 aligns with submissions from local and regional councils. Topic 25 is associated with groundwater and fossil fuel extraction.

Figure 22 shows that overall fairness related terms are given low weight in the computed topics. This is expected because fairness considerations are rarely explicitly raised using these words in submissions. However the relative weighting of these terms is informative - "justice" is relatively strongly associated almost exclusively with topic 23 addressing First Nations submissions, while "fair", "equity" and "equitable" are more broadly associated across many topics. "Fair" is most strongly related with topic 1 (genre) and topic 13 relating to water market operation, while "equitable" is most associated with topics 18 and 26, relating to compliance and water security (possibly associated themselves with the NSW Floodplain Harvesting Inquiry).

The group of topics (30, 28, 15, 29, 21, 16) at the bottom of Figure 22 are notable by their near absence of fairness related terms (apart from "equity"). These topics may be interpreted as technical topics relating to specific operations of the Murray-Darling Basin through specific flow measurements, operations of dams, and connectivity and flows through particular regions.

Twitter

The monthly volume of tweets relating to the Murray-Darling Basin are shown in figure 23. Of the approximately 300,000 tweets matching our search criteria, 20% of them occur in a single month, January of 2019. By examination of the volatility of the tweet counts and trends in specific keywords it is clear that tweet behaviour is driven by sharing and responses to events reported in the media and in politics (shown by the keyword auspol, usually used as #AusPol to join a long standing political conversation around the hashtag).

The particular spike in January 2019 can be explained by a combination of wide media reporting on the second in a sequence of mass fish death events in Menindee (*fish*), and the handing down of the report from the South Australian Murray-Darling Basin Royal Commission (*royal*). Other spikes are related to 4Corners reporting in July 2019 on the operation of water markets and the effectiveness of the Murray-Darling Basin Plan; failed attempts by the National Party to rewrite Federal water policy in Australia in June 2021 (*barnaby* as Barnaby Joyce was recently returned to leadership and *water* as the keyword for policy); the 2022 Federal

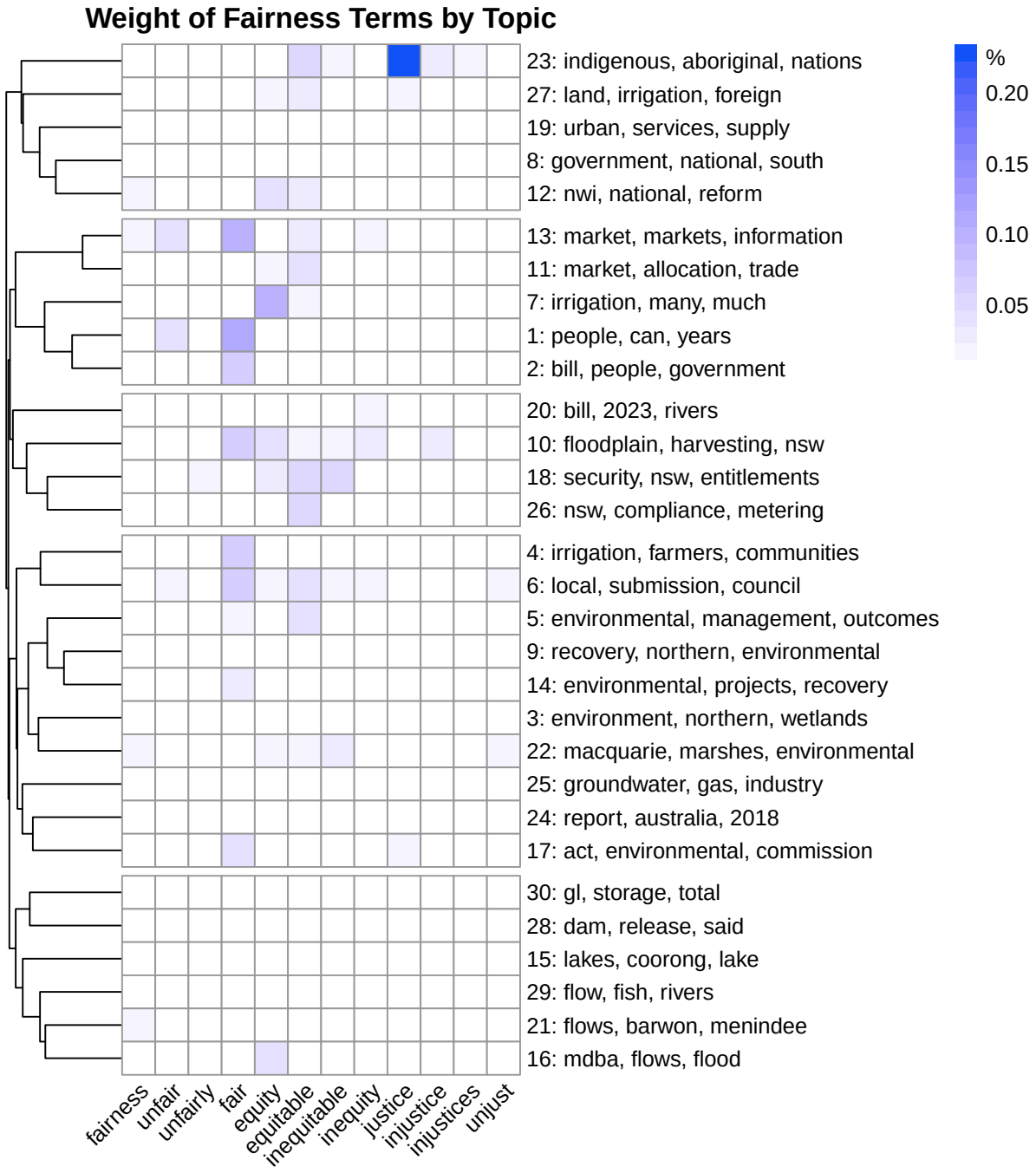

Figure 22: Weights assigned to equity, fairness and justice related words by topic. Although explicit use of these terms is rare, their usage is strongly associated with particular topics. The left hand side of the figure indicates the dendrogram resulting from a complete-linkage hierarchical clustering of the word representations for each topic. The five groups are derived from this hierarchical clustering and represent potentially related groupings of topics.

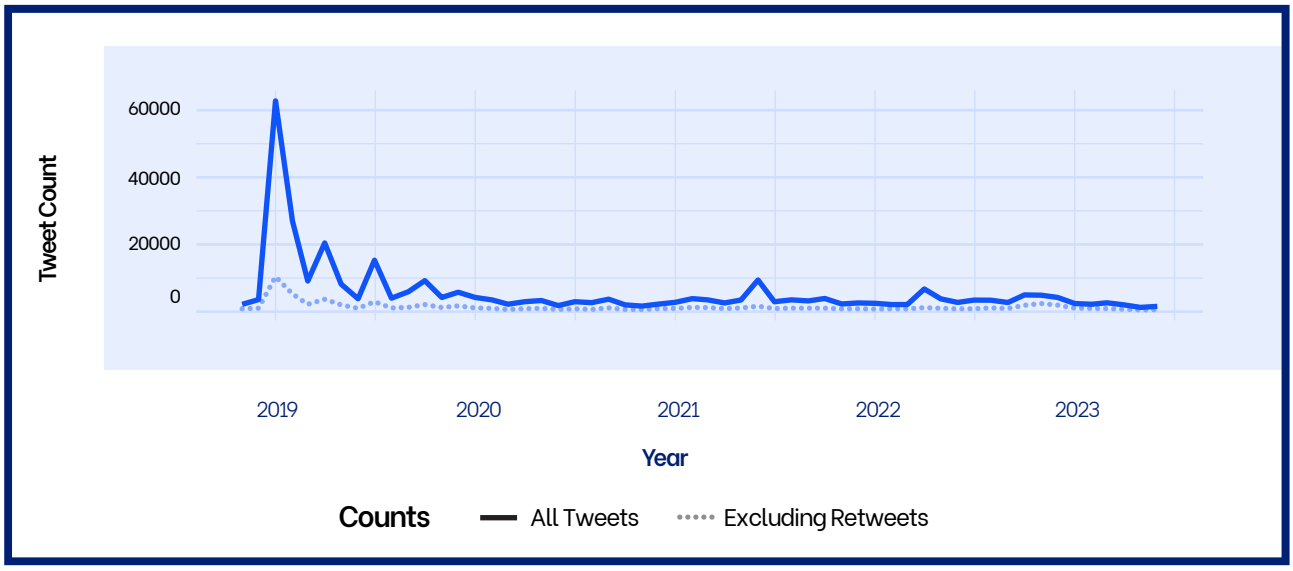

Figure 23: Total monthly tweet volumes for tweets about the Murray-Darling Basin/Plan/Authority.

election (*auspol*); and the late 2022 flooding of the lower Murray-Darling after upstream extreme rainfall (*flood*).

Importantly none of these are new or unexpected issues, and there is no evidence of the issues represented in this Twitter data set that we did not already observe in the submissions themselves. In fact, because the discussions are heavily focused on news and current events any fine grained and nuanced discussions are lost. For example, even focusing on the 450 GL target for water reduction, only on the order of 3144 tweets mention this target directly (approximately 1%) - so these social media discussions cannot be said to engage with even the highest level of detail of the Basin Plan. There is a meaningful difference between the news and events focused discussion that social media enables and the process of submissions being made to an inquiry: even with their limitations the submissions provide a more meaningful and nuanced approach to deliberation.

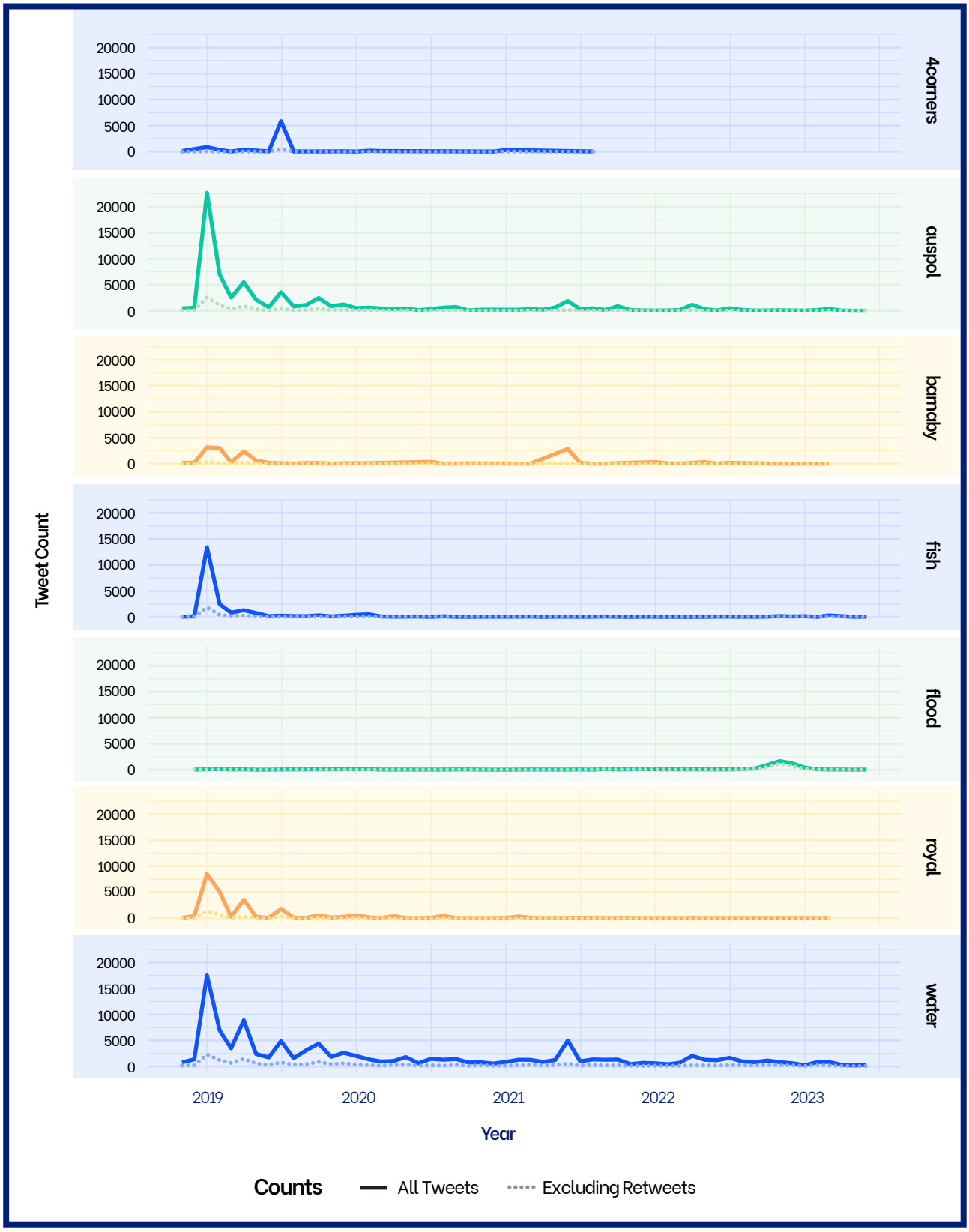
Tweet Count
20000
15000
10000
5000
0
4corners
auspol
barnaby
fish
flood
royal
water
2019
2020
2021
2022
2023
Year
Counts
All Tweets
Excluding Retweets

Figure 24

Methodology

At a high level, our approach can be summarised in the following steps:

1. Collect documents (primarily submissions) and extract the text from each document either directly or through optical character recognition (OCR).
2. Annotate the primary stakeholder group for each of the collected documents.
3. Use corpus linguistic keyword analysis to identify distinctive keywords for the submissions from each stakeholder group as a starting point for understanding the framing of their submissions.
4. Annotate each keyword with the words statistically likely to occur nearby in the text (collocations).
5. Select a subset of keywords for more detailed examination, and examine a sample of how those words are used in the submissions for that stakeholder group by building concordances for each of these keywords.

However, this is an idealisation of our actual approach: we went through several iterations of both data collection and experimentation with analysis methods before arriving at our final selection here. For example, although we started with submissions to public inquiries we chose to expand to analysis of speeches in Federal Parliament and comparison with Twitter (X) data to ensure that submissions to public inquiries provided appropriate coverage of issues for each stakeholder group. We document some additional lines of inquiry that we explored or partially explored in the Other Lines of Inquiry Not Pursued section below.

Data Collection

Ultimately we included three data sources in our analysis:

1. Submissions to a range of public inquiries on issues affecting the Murray-Darling Basin.
2. Second-reading speeches in Federal Parliament on legislation relating to the Murray-Darling Basin.
3. Tweets relating to the Murray-Darling Basin made between 2018 and 2023.

We started with public inquiries as the primary source of data, and added the second-reading speeches and Twitter data to further expand our analysis and enable comparison between a broader set of groups. We focussed on submissions to public inquiries because they represent the views of a diverse range of interested stakeholders seeking to both express a view on government policy and potentially influence it. Submissions provide a key resource to analyse the frames used by political actors in their attempts to influence the water policy terrain in the Basin. Many interest groups organisations republish their submissions on their websites or share them with their membership. Campaign organisations provide standard submissions and encourage their membership and broader base to reproduce and submit them to inquiries (for detailed discussion on how we handled campaign submissions see the box on page 41). Submissions function not only to petition government but also to construct and reinforce the frames used by political actors to understand policy issues and attempt to reshape the policy terrain so it better reflects actors' preferences. An important limitation of our work is that it is limited to those individuals and groups who have made submissions. While we can assume submitters have a stronger motivation to be involved in the "framing contests" over water policy in the Basin, our analysis remains limited and further work is required to identify how generalisable our findings might be.

Submissions to Public Inquiries

There have been a significant number of inquiries in Australia on matters relating to both water policy in general, and the Murray-Darling Basin specifically. We assembled the included inquiries through incremental, purposive sample that approximately covered: the previous ten years (2013-2023), different levels of government (state and Federal), different states, and different policy focus areas and inquiry mechanisms. Through this incremental process, conducted in parallel with experimentation with analysis approaches, and along with the sensitivity analysis outlined in Sensitivity Analysis we reached a point where we considered adding additional inquiries would not substantively change our conclusions and having reached this saturation point ended further data collection. The final list of inquiries is shown in Table 16.

Table 16: Included inquiries and their characteristics.

Inquiry	Year	Government	Abbreviation
Select Committee on the Murray-Darling Basin Plan	2015	Federal Government	SSCMDBP
Select Committee on Floodplain Harvesting	2021	NSW State Government	NSWSCFPH
Productivity Commission National Water Reform	2020	Federal Government	PCNWR
Murray-Darling Basin Water Markets Inquiry	2021	Federal Government	MDBWMI
Murray Darling Basin Authority Basin Plan Amendments	2017	Federal Government	MDBABPA
Murray-Darling Basin Royal Commission	2018	SA State Government	SAMDBRC
Inquiry into the Water Amendment (Restoring our Rivers) Bill	2023	Federal Government	WARORB

To download the public submissions we first scraped the HTML list of submissions for each inquiry from the relevant inquiry page describing the public submissions, and created a metadata file containing primarily the URL of each submission and the listed author of that submission. The results of the process and the resulting metadata tables are included in our archived software as described in Software and implementation.

Preparing submissions for computational analysis required extracting the text of the submissions from the submitted documents (primarily in PDF format). The submitted documents varied widely in form and included: born-digital documents in simple typographical layouts, scans of digitally produced but printed documents (with or without automatic optical character recognition (OCR)), professionally designed and produced materials suitable for printing in the form of brochures or similar media, and scanned versions of handwritten letters. Particularly common were mixed documents that included a scanned cover letter and signature, followed by conventional digital pages. To handle the wide mixture of formats, each document was inspected and annotated in the submission data as one of: *pdf*, indicating that the text can be directly extracted from the submission file; *pdf-ocr*, indicating that the document is scanned and OCR needed to be applied, *pdf-mixed*; indicating that the document has a mixture of digital and scanned content that needs OCR to be applied separately; *pdf-handwritten*, indicating that the material is a scan of handwritten content and no text can be extracted using standard OCR techniques.

For formats with digital text, the PyMuPDF library was used to extract the text directly. For text requiring OCR, the Tesseract library[61] was used to extract the digital text from the document, either for whole pages in the case of the pdf-ocr format, or just of the included images identified with PyMuPDF for the pdf-mixed format. All extracted text was stored with the metadata of the submission (author and inquiry) in an SQLite database. Handwritten documents were not included for analysis due to the combination of the small number of cases (22/2271 total documents) and the time intensive nature of the transcription.

Proceedings of Federal Parliament

Australian Federal Parliament is responsible for key legislation enabling the Murray-Darling Basin Authority and the implementation of the Murray-Darling Basin Plan. Therefore, the prepared speeches given at key points of the passing and amendment of the relevant legislation represent focal points for elected representatives to speak directly to the issues of water policy in Australia. We chose to include the second-reading speeches for legislation directly related to water management with at least ten speeches made - the titles in Hansard for the relevant bills are included in the appended section Included Hansard Debates. Relevant legislation was selected based on the debate title and our knowledge of the history of water legislation in Australia. We explored, but elected not to include, both committees formed to study particular legislation and disallowance motions for proposed regulations. We excluded committees because they are fundamentally more conversational in format than prepared speeches making them difficult to compare to the more formal submissions to inquiries. We excluded the disallowance motion speeches because of the low volume of speeches.

The HTML pages for each of the relevant speeches were extracted from the complete HTML archive of the Parliamentary Library's as extracted with the https://github.com/SamHames/hansard-tidy, and the text of the speech extracted directly by removing tags from the relevant HTML. Each speech was associated with the relevant elected representative as author, and collectively the speeches in Federal Parliament were considered as a pseudo-inquiry for the purposes of analysis.

Identifying Stakeholder Groups

After initial examination of a sample of submissions to the inquiries and development of our purposive sampling strategy for the Q-study,[62] we created the following typology of stakeholder groups.

Agriculture Individual farmers (irrigators and dryland), representative agricultural bodies (e.g. National Farmers Federation, National Irrigators Council, NSW Irrigators Council), irrigation schemes (e.g. Murrumbidgee Irrigation)

Environment Environmental groups (e.g. Wentworth Group, Australian Conservation Foundation, Environmental Defenders Office), individuals expressing strong environmental views

First Nations First Nations organisations (e.g. Murray Lower-Darling Indigenous Nations), individuals self-identifying as Aboriginal

Commercial, non-agriculture Superannuation funds, water traders, consulting firms, law firms

Government Federal and State departments and agencies, local and shire councils, local government representative organisations, catchment management authorities and state-owned corporations

Regional Regional small-businesses (e.g. tourism), recreational fishers, regional sporting groups, government or other associations with a specific regional interest (e.g. Regional Development Australia)

Resource managers Water and catchment managers including people ranging across dam managers, irrigation companies and Catchment Management Authorities

Research University researchers, CSIRO, learned Academies

Elected Representative Federal elected representatives speaking in Parliament

Not categorisable Submissions that could not be categorised to any of the above groups.

An analyst with water policy experience and expert knowledge of water policy stakeholders in the Murray-Darling Basin assigned each submission to one or more stakeholder groups under the supervision of the authors and external reviewers. Submissions were assigned to stakeholder groups based on the assigned

author of the submission and relevant statements about their identity in the text of their submission: for example a submission by SunRice, and a hypothetical submission that begins with "I am a farmer in <region>" would both be assigned to the agriculture stakeholder group. In some cases, submissions indicated multiple stakeholder groups would be appropriate. To handle these cases, submissions were assigned to a ranked list of stakeholder groups and the highest ranked group was used as the label for that submission in the following analyses.

Note that the annotation was solely based on the declared author and content of submissions: our assignment to stakeholder groups is therefore an interpretation of what has been submitted and not a pre-existing property of the submission. It is possible that a submitter would disagree with our categorisation. As our downstream analysis aggregates over all of these decisions our interpretation does not need to be correct in every case to be useful.

Similarities Between Groups

Having grouped submissions based on the submitter, we proceeded to examine how language is used at multiple scales. We began our analysis at the broadest scale: language and word usage use averaged across all submissions in a group using cosine similarity to evaluate how similar (or otherwise) the groups of stakeholders are to each other in their language use at the broadest sense. To perform this analysis we:

- Tokenised (break down into words) the full text of each submission, removing common words such as *the*, *and*, *or* and so on (see 4.4 for complete details).
- Represented each submission by the standard bag-of-words vector with term-frequency inverse-document frequency weighting and length normalisation[63].
- Represented the entire group by the average of the word-vectors for each of the submissions.
- Calculated the pairwise cosine similarity between each pair of groups to generate a heatmap of similarities between groups (see Figure 3).
- Conducted a hierarchical complete-linkage clustering of the groups to generate a dendrogram visualisation to further support analysis of the heatmap and similarities.

This analysis provides a high-level overview of the similarities between groups - groups that use the same words in similar proportions will have higher similarity, groups that do not share words at all, or have significantly different proportions of frequent words will have lower similarity. Note that high similarity does not mean that the groups are the same, only that their vocabulary is similar. As we are aiming to examine how issues are framed, a high similarity between two groups might indicate that they accept fundamental features of the policy terrain, but still fundamentally disagree on what should be done within that terrain.

We complement this analysis with a simple group wise word frequency analysis, by counting the number of times each word is used across that group, after removing stopwords and some genre words as explained in Keyword and Collocation Analysis to Understand Framing. The top twenty most frequent words were recorded and counted for each group - words that were frequent across all groups were used as a starting point for identifying possible common framings shared across groups (or equally, frames that might be specific to only one group).

Keyword and Collocation Analysis to Understand Framing

We chose to use keyword and collocation analysis as our primary entry point for a detailed comparison of the language used across submissions - while the cosine similarity between groups illustrates some aspects of how submissions might share or not share frames, it does not identify what the points of difference and similarity actually are between groups. We therefore draw on the toolbox of corpus linguistics, particularly keyword analysis, over other approaches.

Relevant alternative approaches include topic modelling and sentiment analysis, which have been situated as text mining approaches in contrast to our corpus linguistic approach (see[64] for a more detailed comparison). While these other approaches have their place (and we did experiment with topic modelling as described in Other Lines of Inquiry Not Pursued), we faced two challenges in the context of this work. Firstly, it is difficult to tie the outputs of a completely unsupervised approach like topic modelling back to specific textual elements and therefore to narrative frames, and in the worst case, the word lists produced by a topic model may give a misleading impression of what might be gained by a close reading of the documents.[65] Similarly, for approaches like sentiment analysis that aim to infer a submitter's stance on a particular issue (for example, are they positive, neutral, or negative towards an issue), we considered it more useful to focus on what they have chosen to discuss and how they are framing issues, rather than relying on a quantitative aggregate drawn from models trained on other corpuses. Consequently we did not use sentiment analysis because of the complexity of the policy landscape, different areas of focus (such as projecting hypothetical futures compared to describing perceived current problems and harms), as well as the complex terms of reference of many inquiries and the multiple distinctive genres of submissions we ended up observing.

To create a ranking of keywords for each submitter group we used the chi-squared statistic for the distribution of words across each submitter group compared to all other groups combined. Note that we depart from some standard corpus-linguistic approaches in three ways in our analysis here: firstly we do not count the number of times each word is used, only the number of submissions that include that word. We do this to account for the wide variety of genres and lengths of submissions, and therefore ensure that our analysis focuses on the dispersion of words across submitters. If we did not take this approach, we would give proportionally more weight to longer, and typically more technical, submissions and downplay the weight of short, focused submissions. Secondly, we use the chi-squared measure as a descriptive measure of dependence between groups and words rather than in an inferential-statistics framework. We choose a fixed number of words to examine across all groups to ensure that they receive similar levels of attention, rather than applying a statistical threshold to find "the" keywords. Thirdly corpus linguistics now typically uses effect size measures[66] rather than the statistical significance chi-squared measure we use here. This is because our specific purpose here is to explore the breadth of differences in keyword use across groups of submitters. A common word used slightly more by one group compared to all others is interesting for our analysis, but would not be visible through a test of effect size.

More specifically, in order to identify keywords we:

1. Tokenised the text of submissions using the tokeniser available in the Quanteda[67] package which primarily uses whitespace to identify the start and end of words: we elected to remove words that consisted of a single character, punctuation, symbols and split words on hyphens.
2. Counted the words in each document, then reduced that to a boolean measure: either a word was present (1), or it was absent (0).
3. Filtered out words that occurred in fewer than 10 documents across all submissions, and we also filtered out the standard Quanteda list of stopwords (these are functional words such "the", "and", "or" etc).
4. Conducted a keyword statistical test, comparing the counts of documents containing words in a group to the documents containing that word in all other groups. Again we used the quanteda[67] package, and we elected to use the simple chi-squared measure to identify keywords.

Initial keywords identified by this process can be considered as one of two groups: content words that articulate the unique aspects of these submissions, and genre words that are required by the particular formats of submissions made by that group. Examples of particular genre markers include academic citations with details like page numbers and the phrase "et al."; speeches in Federal Parliament addressed to the Speaker of the House or the President of the Senate; and submissions from government organisations including a header and footer on each page with the name and address of the organisation. After keyword identification, identified genre defining words were added to the list of words to ignore and excluded from consideration. The keyword analysis was repeated with this new list. We did this to avoid certain stakeholder groups keywords solely consisting of words related to the genre of their submissions rather than the substantive content, however as we shall see in Differences Between Groups, there are some limitations in our assessments of stakeholder groups that made this less useful than expected. We also found that despite this step the genre elements for some groups (e.g. researchers, elected representatives) remained dominant. This makes intuitive sense as these groups refer to submissions (in the case of researchers) or speeches (for Parliamentarians) given by individuals with allegiances to different interest groups. While individual texts from members of these groups adopted the frames found in other groups, this was only apparent through close reading of these texts (see the further discussion in the Research and Elected Representatives sections below).

In order to identify collocations (words that were statistically likely to be near a keyword in a group of submissions) we:

1. Constructed a window of 10 words either side of each keyword occurring in that group of submissions.
2. Constructed a window of all other words occurring not inside the window.
3. Ranked words that were likely to occur in that window near the keyword compared to all other locations in the text, again using the chi-squared statistic.

We acknowledge that there is an element of circularity here given that we have coded submissions to stakeholder groups based on the same text we are analysing for differences between groups. Our approach is still meaningful, however, because coding a submission to a stakeholder-group did not require analysis of the text given the group was primarily coded using the submission author or a submission's opening statement.

This analysis allows us to focus on what is distinctive (or over-represented) in each group compared to all other group and analyse how a keyword is typically employed by a group. This does not mean necessarily that we have covered all issues that are relevant to each group, or that what is statistically distinctive for one group is not shared with other groups, just that it is more typically associated with one group compared to the others.

Connecting keywords and collocations to framings

The keywords and collocations identified by the procedure above provide a starting point for more detailed qualitative analysis, but do not yet provide a complete picture of the submissions. To ground our analysis in the specific language used by each group, we sampled up to twenty concordance lines for each keyword in each stakeholder group (each up to twenty tokens either side of the keyword). This sample was used, in conjunction with the collocations, to provide a robust sample of how each keyword was used in context across all groups.

We analysed the frames used by each group through a combination of keyword analysis alongside close reading of the sampled concordances and collocations returning to the original submissions for further context. For each group frame analysed here, we provide our summary of each frame, representative quotations and a graphic representation of the dispersion of select keyword across groups to show how different stakeholders choose to use and take up different frames.

Analysis of fairness concepts

We also examined the way keyword choices relate to framing storylines about fairness concepts. We did this through an interpretation of the keywords as well as direct analysis of collocations with a hand selected group of words either unambiguously about the fairness concepts for each group, or directly related to issues that cut across many groups.* We further explored these specific fairness framings by extracting concordances for these fairness concepts for further close reading of individual submissions.

Sensitivity Analysis

To determine how appropriate our coverage of stakeholder groups and inquiries was, we conducted a leave-one-inquiry-out sensitivity analysis and performed the same keyword analysis. In this analysis we used exactly the same approach to generate keyword lists for each stakeholder group compared to all other groups, but we excluded one inquiry at a time from the data. This gives us one set of keywords per inquiry, as if we had decided not to collect or include that inquiry in the analysis. Comparing the keyword rankings from each alternative smaller collection gives us insight into the stability of the keyword ranking for the data we have collected, and also allows us to examine whether we have reached something close to saturation given our choice of inquiries and can be reasonably confident we are unlikely to fund further distinct frames by adding additional inquiries.

Topic modelling

To complement our keyword analysis, and to confirm that our examined frames were not solely driven by our assignment of submissions to groups, we used standard latent dirichlet allocation (LDA)[55] to provide a high-level summary of the content of submissions as a whole without regard to the inquiry or source of the document. While topic models pose challenges for interpretation they provide a useful starting point for initial understanding before more detailed analysis and close reading. We used the standard LDA implementation from the seededlda R package[68], choosing 30 topics by cursory examination of a range of numbers of topics (20, 30, 40). †

To provide structure for the arrangement of topics we also conducted a hierarchical clustering of the resulting topic matrix. Each topic was represented by the vector of weights associated with each term included in the model, and the distance between vectors was calculated using the approximate 1 - the cosine similarity. The complete linkage approach was used for the hierarchical clustering. For visualisation purposes we used the dendrogram and a hard cut to five clusters to provide additional structure.

Twitter Analysis

Social media was chosen as a point of comparison with our submission and Parliamentary speech data to determine if there were any key focal areas or areas of concern that were either not present in submissions, or were not identifiable through our keyword analysis. Rather than treating social media as representative, we aimed to use this analysis a further point of triangulation on the assumption that if we identified substantive issues on social media that were not present in the submissions that would raise interesting questions about the value of the inquiries.

We chose to focus on Twitter (now X) as a reference social media site over the time of the inquiries in this

*The words chosen were fairness, equity and justice and their derivations (i.e. unfair, unfairness, inequity, equitable, unjust, injustice etc.) alongside words words we identified as being often associated with storylines around fairness across the corpus (including 'crisis', 'market', 'community', 'communities', and 'water').

†We did not aim to optimise the number of topics according to any routine, as we conducted topic modelling after group annotation, keyword analysis and examination of concordance lines.

analysis because:

- Twitter has a strong news and events focus
- Twitter discussions are largely public
- Queensland University of Technology's Digital Observatory has historical aggregate data covering both a large number of Australian identified accounts for a time period that overlaps with our submissions.

With the assistance of the Digital Observatory we were provided with aggregate counts of the number of tweets matching particular search queries chosen to capture discussion specific to the Murray-Darling Basin, the Murray-Darling Basin Authority and the Murray-Darling Basin Plan. In addition to the counts of tweets matching the overall queries, we were also provided a counts of words used within those tweets to partially examine the context and key issues discussed in the context of the Murray-Darling Basin.

To analyse this data, we first examined the trends of tweet counts over the period from November 2018 to June 2023 (the full data window available in the longitudinal collection), broken down by the monthly count of tweets, count of tweets excluding retweets, and the active number of users tweeting. Secondly we selected issue specific keywords and examined the trend of how they were used over time to infer the major topics and trends of discussion. Our aim was to identify key issues that people were tweeting about.

Software and implementation

The software used to download and analyse the submissions and other relevant data is made available at `https://github.com/watertrustaustralia/equityText`.

Python was used to orchestrate the download of individual submissions and extract the text from PDF documents, including using the Tesseract package[61] for optical character recognition for scanned documents. The keyword and collocations analysis was undertaken in R using the Quanteda package[67].

Note that we cannot share the submissions themselves due to copyright considerations: we share the code to enable others to download and prepare the submissions for further analysis. We also include overview data files for each inquiry with URLs for each submission we used in this work for transparency.

Limitations

Limitations in using submissions

Our computational starting point for analysis based on differentiation of submissions into stakeholder groups and identification of keywords, followed by detailed close reading and description of specific framings has revealed that there are fundamental differences between stakeholder groups in the water space. Each stakeholder group has a particular frame and set of narratives that they surface that is not widely taken up, or only partially taken up by other stakeholder groups. Stakeholder groups have only partial perspectives on the whole water system in Australia. However, there are also areas of shared concerns between pairs and groupings of stakeholders that indicate shared starting points for coordination and productive deliberation.

Submissions to inquiries do not broadly represent stakeholder groups but rather provide a sample of those with the capacity, willingness, and resources to prepare a submission. Engagement with inquiries depends heavily on the terms of reference and capacity and support for engagement. Making effective use of public submissions to understand frames used by political actors in the debates around water policy in the Basin requires sensitivity to who is not submitting and how that might indicate perspectives that are missing. The other side of this challenge is the role of civil society in effecting outreach and engagement for public submissions. We have shown evidence that organised campaigns can lead to large numbers of submissions, the question is how can this be directed in ways that lead to meaningful submissions rather than form submissions based on a template? Alternatively, we might ask if there are other ways to enable public contributions with inquiries beyond making a submission?

Inquiry design also needs to take into account how previous inquiries may have covered the same or similar areas. Inquiries rarely occur in a vacuum, and especially so for any inquiry into a contested policy area. Aggregation and reanalysis of existing inquiries on a larger scale is a promising direction for better understanding the policy landscape around a contentious issue. By identifying patterns of evidence that persist across stakeholder groups and inquiries at different times and with differing terms of reference we are likely to identify unaddressed areas of concern in formulating the terms of reference for future inquiries.

Almost uniformly inquiries we examined accepted submissions as single rich document (almost always PDF), with very limited and unstructured data collected about who was making the submission. The lack of structured metadata about submitters substantially limits what can be done with large numbers of submissions. Additional attention to metadata collection at the time of submission (for example distinguishing between individual submissions and submissions on behalf of organisations) would enable new perspectives for analysis, especially if this can be standardised across inquiries. The focus on single rich documents as the object of submission also has implications for analysis and imposes a substantial barrier to undertaking analysis like we have done here to understand the bulk of submissions: constraining submissions to simpler formats may enable new kinds of engagement with the whole of the submissions to an inquiry, rather than as a single listing of authors and links to files.

Limitations in our analysis

Our analysis here has a number of limitations. These limitations all affect different parts of the analysis phases and may impact our interpretation in various ways.

For the data collection phase we are limited in the following ways: we rely on a mixture of OCR and text extraction to represent submission documents digitally, but OCR processes can contain errors, and even where

OCR isn't necessary, extracting and representing some of the complex documents included in our submissions here can be complicated by the structure. For example, we don't make a distinction between the body of a document and headers and footers. Additionally we did not attempt to transcribe and include handwritten documents in our analysis, and our analysis only includes public submissions: confidential submissions may have substantively different content and policies for handling confidential materials differed across inquiries.

Identification and labelling of stakeholder groups is challenging based on the submissions alone: while we were able to make judgements in most cases, it was in some cases difficult to make precise distinctions about which of several groups was the primary label for that submission. Since we rely on the primary label for our analysis it is possible we have not captured the full nuance of the submissions in our keyword analysis. Additionally our typology of groups has some limitations: our government group includes both government organisations and elected representatives at multiple levels of government, and we do not make distinctions between individual submissions and submissions made on behalf of organisations.

For our keyword analysis and interpretation we only considered the text of submissions: many submissions included richer media such as photos, artworks, infographics, and charts that were not considered in our analysis at all. Our analysis also primarily focused on identifying the distinctive characteristics of each group by examining the differences. Although we partially address this by looking at the dispersion of keywords across all groups, we may have missed common patterns that are shared across all groups. Finally we examined only single words as words and did not attempt to identify richer information, such as key phrases (e.g. lived experience) or named entities (such as the MDBA). Our analysis is also just that, our analysis and interpretation of the submissions - since our goal was partly to understand how different groups were engaging validating and complicating our interpretation with submitters themselves is important. While our computational approach standardised our analysis, building the narrative frames required further interpretation.

Our social media analysis relied solely on a single platform (Twitter), and only focused on a highly aggregated analysis of trends and keywords that was divorced from the actual posts being made. Partly the choice to focus on Twitter was a pragmatic one given our desire to analysis historical trends and the availability of a high quality archive.

Despite these limitations we believe that our analysis provides useful insights into understanding how different stakeholder groups have approached making submissions to public inquiries.

Suggested Future Work

There are a number of lines of inquiry suggested by this work and the limitations and conclusions we have already raised:

1. The analysis we have conducted here relies on identification of patterns across large numbers of submissions: it would be instructive to validate the results of our analysis in the context of the identified stakeholder groups (and ideally those who made submissions).
2. Application to different policy areas would enable further validation on the strengths and limitations of our methodology as a general approach. This would also enable consideration of this approach as an analytical approach to support the conduct of an inquiry, and not just as a retrospective analysis.
3. The submissions analysed here are generally focussed on national or state policy issues. This may decrease the detail in the submissions and increase the use of stereotypical frames. Further work using submissions and interviews to more local or regional inquiries may provide additional nuance not visible at coarser spatial scales.
4. There are multiple extensions to our baseline analysis drawing on NLP and corpus linguistic tools. Examples of particular interest include named entity recognition to support structured recognition of people, places, and institutional actors; improving our tokenisation approach by using n-gram analysis to identify repeated phrases rather than treating them as separate words.
5. Support future inquiries by outlining a minimal set of structured metadata about submissions, and submission formats that would enable streamlined qualitatively informed analysis of large volumes of submissions (without discarding the fine detail of single submissions).
6. Can we provide visualisations, indexes, or other summaries to provide more meaningful access to public submissions? Even enabling the search and retrieval of submissions could be used to support deliberative engagement across stakeholder groups.

Other Lines of Inquiry Not Pursued

Comparisons Between Submissions to Different Inquiries

We briefly examined keywords for differences in submissions to different inquiries, primarily to determine to what effect the terms of reference and purpose of the specific had on the language used. Not surprisingly there were some differences, but making sense of the effects of the inquiry was found to be less useful compared to the differences in submissions between stakeholder groups. Furthermore because different inquiries received different levels of engagement from different stakeholder groups it was even harder to understand the resulting picture. Ultimately the sensitivity analysis we conducted in Sensitivity Analysis provided more useful insight into inquiries as confounding factors, both in terms of the terms of reference and in terms of what kind of engagement the inquiry had with different stakeholder groups.

Evaluating Moral Content of Submissions

We explored using the extended moral foundations dictionary[69] to evaluate the moral languages and claims used in submissions. While there were some interesting tendencies and differences between groups implied by the results we chose not to explore this further. This was because the wide variety of genres of submissions and the significant variations in document length combined to make the estimates of moral concepts in submissions very noisy, and we did not think it would be a reliable approach to understanding differences between stakeholder groups. Additionally, the specific training data used for the development and validation of the EMFD dictionary was based on news media texts, and we were concerned about the validity of applying that dictionary and set of measures as-is to the very different (and widely varied) context of submissions to public inquiries.

Included Hansard Debates

The complete titles of the debates for which Hansard speeches were drawn are shown in the list below.

- Water Amendment (Restoring Our Rivers) Bill 2023 Second Reading
- WATER BILL 2007 WATER (CONSEQUENTIAL AMENDMENTS) BILL 2007 Second Reading
- Water Amendment Bill 2015 Second Reading
- Water Amendment (Water for the Environment Special Account) Bill 2012 Second Reading
- WATER AMENDMENT BILL 2008 Second Reading
- Water Amendment Bill 2018 Second Reading
- Water Amendment (Long-term Average Sustainable Diversion Limit Adjustment) Bill 2012 Second Reading
- Water Amendment (Review Implementation and Other Measures) Bill 2015 Second Reading
- National Water Commission (Abolition) Bill 2015 Second Reading
- Water Legislation Amendment (Inspector-General of Water Compliance and Other Measures) Bill 2021 Second Reading
- Register of Foreign Ownership of Agricultural Land Amendment (Water) Bill 2016 Second Reading
- Water Amendment (Indigenous Authority Member) Bill 2019 Second Reading
- Environment Protection and Biodiversity Conservation Amendment (Expanding the Water Trigger) Bill 2023 Second Reading
- National Water Commission Amendment Bill 2012 Second Reading
- Water Legislation Amendment (Sustainable Diversion Limit Adjustment) Bill 2016 Second Reading

Submitters of Highest Weighted Documents for Each Topic

Table 17: Topics identified using LDA. Topics are arranged in descending order of estimated prevalence. The indicated words are arranged in descending order of estimated weight for that topic. The highest weighted submissions columns indicated the name of the submitters of the highest weighted documents for that topic.

Rank	Prevalence (%)	Twenty Highest Weighted Words	Submitters of Highest Weighted Submissions
1	9.8	people, can, years, now, need, us, just, time, like, environment, many, drought, see, one, system, get, food, land, farmers, much	Balonne Shire Council, Name suppressed, Goodooga Aboriginal Community
2	7.9	bill, people, government, communities, minister, south, gigalitres, just, going, senator, can, australia, know, system, get, think, want, one, said, time	Wong, Sen Penny, Cameron, Sen Doug, Nash, Sen Fiona
3	7.1	environment, northern, wetlands, environmental, important, needs, species, flows, ecosystems, gl, cultural, values, reduce, returned, available, reduction, proposal, impacts, significant, protect	Helen Ford, Caroline Cosgrove, Helen Kvelde, Isabelle Connolly
4	5.0	irrigation, farmers, communities, production, farm, irrigators, economic, food, industry, agriculture, dairy, agricultural, irrigated, environment, environmental, australia, productive, infrastructure, impact, regional	Mr James Sides, Mr Doug Thomas, Fonterra Australia
5	4.8	environmental, management, outcomes, communities, impacts, economic, community, implementation, environment, use, social, including, long, objectives, need, term, system, resources, benefits, needs	Murray Darling Association Inc., Murray-Darling Basin Authority (MDBA), NSW Farmers' Association
6	4.3	local, submission, council, community, communities, government, region, committee, association, economic, shire, box, regional, social, opportunity, australia, members, po, cotton, industry	RDA Murraylands & Riverland Inc (RDAMR), Country Mayors Association of NSW, South Australian Wine Industry Association Incorporated
7	3.8	irrigation, many, much, environmental, policy, political, australia, even, issues, mdb, made, one, case, can, issue, way, system, point, like, based	Alistair Watson, Bill McClumpha, Mr Samuel Denton
8	3.7	government, national, south, state, australia, commonwealth, states, new, australian, bill, commission, climate, governments, agreement, change, australia's, reform, authority, minister, drought	Garrett, Peter, MP, Garrett, Peter, MP, Butler, Mark, MP

Table 17: Topics identified using LDA. Topics are arranged in descending order of estimated prevalence. The indicated words are arranged in descending order of estimated weight for that topic. The highest weighted submissions columns indicated the name of the submitters of the highest weighted documents for that topic.

Rank	Prevalence (%)	Twenty Highest Weighted Words	Submitters of Highest Weighted Submissions
9	3.7	recovery, northern, environmental, mdba, proposed, review, measures, outcomes, communities, amendments, economic, target, authority, reduction, impacts, gl, queensland, flow, toolkit, changes	Murray Darling Association - Region 11, Peter O'Brien, National Farmers Federation (More than Flow Campaign-185 submissons received)
10	3.5	floodplain, harvesting, nsw, take, fph, farm, 2021, must, management, flood, rainfall, rivers, downstream, regulation, limits, rules, licence, government, northern, within	Name suppressed, Name suppressed, Name suppressed
11	3.4	market, allocation, trade, trading, price, prices, irrigators, entitlement, markets, use, can, carryover, entitlements, available, demand, temporary, victorian, allocations, time, information	Victorian Environmental Water Holder, AJ and MH Spiers, H2OX
12	3.1	nwi, national, reform, commission, productivity, report, management, draft, planning, climate, 2020, governments, government, infrastructure, submission, advice, framework, change, policy, outcomes	WWF-Australia, Local Government NSW (LGNSW), Public Interest Advocacy Centre (PIAC)
13	3.1	market, markets, information, trade, accc, report, trading, data, interim, participants, regulation, state, transparency, options, rules, trades, inquiry, including, states, brokers	Southern Cross Farms, NSW Farmers Association, National Farmers' Federation
14	3.0	environmental, projects, recovery, outcomes, commonwealth, adjustment, measures, sdl, gl, efficiency, government, sustainable, implementation, south, project, additional, infrastructure, program, diversion, also	Joyce, Barnaby, MP, Ruston, Sen Anne, Farrell, Sen Don
15	3.0	lakes, coorong, lake, lower, mouth, south, system, barrages, flows, drought, sea, salinity, levels, alexandrina, fresh, salt, sa, region, albert, australia	Mr Sean D Murphy, Central Murray Environmental Floodplains Group Inc, The committee of the Meningie Narrung Lakes Irrigators Association
16	2.7	mdba, flows, flood, constraints, goulburn, flow, flooding, environmental, impacts, day, strategy, property, proposed, high, management, report, risks, landholders, private, major	Ms Jan Beer, Upper Goulburn River Catchment Association, Mr John Warren
17	2.6	act, environmental, commission, sustainable, royal, resources, mdba, resource, section, 2007, economic, use, relevant, may, submission, commonwealth, must, take, management, south	Dr Anita Foerster | Prof. Alex Gardner, Mr Dugald Bucknell, Michael Murray
18	2.5	security, nsw, entitlements, allocation, irrigation, entitlement, general, use, high, valley, users, nswic, murrumbidgee, system, allocations, southern, holders, rules, sharing, reliability	Submission Provider A, SunRice and Ricegrowers' Association of Australia (RGA), Greater Shepparton City Council (GSCC)
19	2.5	urban, services, supply, infrastructure, planning, regional, service, quality, local, government, national, drinking, can, utilities, new, cost, funding, health, communities, investment	Water Services Association of Australia (WSAA), Unitywater, Zero Mass Water Australia

Table 17: Topics identified using LDA. Topics are arranged in descending order of estimated prevalence. The indicated words are arranged in descending order of estimated weight for that topic. The highest weighted submissions columns indicated the name of the submitters of the highest weighted documents for that topic.

Rank	Prevalence (%)	Twenty Highest Weighted Words	Submitters of Highest Weighted Submissions
20	2.4	bill, 2023, rivers, amendment, restoring, provisions, buybacks, recovery, projects, environmental, environment, 450, deliver, communities, 450gl, outcomes, gl, proposed, government, measures	A&S Davoli, Mrs Rosa Hillam, Cordoma Group
21	2.3	flows, barwon, menindee, flow, northern, nsw, lakes, lower, years, extraction, system, low, bourke, sharing, environmental, downstream, mdba, class, irrigators, extractions	Wilcannia Community Tourism Association Inc, Mr Geoff Wise, Geoff Wise, NSW
22	2.2	macquarie, marshes, environmental, flows, floodplain, area, irrigation, wetland, mdba, flow, system, industry, nsw, grazing, landholders, flood, red, redacted, warren, valley	Macquarie Marshes Environmental Landholders association, The Macquarie Marshes Environmental Landholders Association, Garry Hall
23	2.2	indigenous, aboriginal, nations, cultural, first, rights, people, traditional, peoples, land, communities, access, country, interests, northern, owners, management, nt, native, development	Ngarrindjeri Regional Authority, Grant Rigney, Martuwarra Fitzroy River Council and Water Justice Hub
24	1.8	report, australia, 2018, australian, 2019, review, change, 2017, climate, et, al, research, 2020, modelling, department, analysis, 2016, commission, available, 12	Associate Professor Cameron Holley, UNSW Sydney | Associate Professor Darren Sinclair, University of Canberra | Dr Tariro Mutongwizo, UNSW Sydney | Amelia Brown, UNSW Sydney, Professor Sarah Wheeler | Professor Jeff Connor | Professor Quentin Grafton | Professor Lin Crase | Professor John Quiggin, Grafton and Williams
25	1.8	groundwater, gas, industry, use, soil, coal, quality, well, resources, can, queensland, mining, energy, australia, surface, used, western, new, associated, aquifer	Australian Petroleum Production and Exploration Association (APPEA), Wando Conversation and Cultural Centre, Tabitha Karp and Celia Karp
26	1.8	nsw, compliance, metering, information, access, management, take, licence, department, meters, government, sharing, environmental, can, plans, industry, public, 2018, users, consultation	State Government of NSW, Irrigation Australia, Rosa Hillam
27	1.7	land, irrigation, foreign, rural, family, investment, ownership, scheme, owned, register, security, management, infrastructure, public, new, farms, access, mi, government, hill	Mr Keith Greenham AM, Gallagher, Sen Katy, Morrison, Scott, MP
28	1.7	dam, release, said, 2015, government, griffith, farmers, 15, nsw, australia, per, mg, murrumbidgee, september, drought, history, million, year, burrinjuck, australian	Mrs Frances Pietroboni, Fran Pietroboni, Frances Pietroboni
29	1.4	flow, fish, rivers, flows, management, species, floodplain, et, ecological, al, freshwater, research, natural, habitats, australia, habitat, wetlands, environmental, aquatic, large	Dr Martin Mallen-Cooper, CSIRO, Professor Richard Kingsford
30	1.4	gl, storage, total, average, year, dam, capacity, 100, data, figure, page, flow, storages, inflows, annual, use, rainfall, system, 200, level	Lindsay Leake, VIC, Mark Hegarty, John Kell

References

[1] Scott M. Moore. *Subnational Hydropolitics: Conflict, Cooperation, and Institution Building in Shared River Basins*. Oxford University Press, 2018.

[2] C. Guest. "Managing the River Murray: One Hundred Years of Politics". In: *Decision Making in Water Resources Policy and Management*. Elsevier, 2017, pp. 23–39.

[3] Harry Brighouse et al. "Good education policy making: Data-informed but values-driven". In: *Phi Delta Kappan* 100.4 (2018), pp. 36–39.

[4] G.J Syme, B.E Nancarrow, and J.A McCreddin. "Defining the Components of Fairness in the Allocation of Water to Environmental and Human Uses". In: *Journal of Environmental Management* 57.1 (Sept. 1999), pp. 51–70.

[5] Finley Watson, Nick Barry, and Rod Marsh. *Equity, Fairness and Justice in Water Policy: Literature Review*. Canberra: Watertrust Australia, 2024.

[6] Harold D Lasswell. *Politics: Who Gets What, When, How*. Whittlesey House, 1936.

[7] Jacob S. Hacker and Paul Pierson. "After the "Master Theory": Downs, Schattschneider, and the Rebirth of Policy-Focused Analysis". In: *Perspectives on Politics* 12.3 (Sept. 2014), pp. 643–662.

[8] Terry M Moe. "Power and Political Institutions". In: *Perspectives on Politics* 3.2 (2005), pp. 215–233.

[9] Deborah A. Stone. *Policy Paradox: The Art of Political Decision Making*. 3rd. New York: W.W. Norton & Co, 2012.

[10] William Gamson and Andre Modigliani. "The Changing Culture of Affirmative Action". In: *Research in Political Sociology*. Ed. by Richard Braungart. Vol. 3. Greenwich, CT: Jai Press, Inc, 1987, pp. 137–177.

[11] Frank Fischer. *Reframing public policy: Discursive politics and deliberative practices*. Oxford University Press, 2003.

[12] W. B. Gallie. "IX.—Essentially Contested Concepts". In: *Proceedings of the Aristotelian Society* 56.1 (June 1, 1956), pp. 167–198.

[13] Rebecca Nelson et al. *Water, Law and Concepts of Equity*. Canberra: Watertrust Australia, 2024.

[14] Adam Swift. *Political philosophy: a beginners' guide for students and politicians*. John Wiley & Sons, 2019.

[15] Joel Feinberg. "Social philosophy". In: (1973).

[16] Allen Buchanan and Deborah Mathieu. "Philosophy and justice". In: *Justice: Views from the social sciences*. Ed. by R. L. Cohen. Springer, 1986, pp. 11–45.

[17] R. Mark Isaac, Deborah Mathieu, and Edward E. Zajac. "Institutional Framing and Perceptions of Fairness". In: *Constitutional Political Economy* 2.3 (Sept. 1991), pp. 329–370.

[18] Edward E Zajac. *Political economy of fairness*. Mit Press, 1995.

[19] Herbert Lionel Adolphus Hart. *The concept of law*. Oxford University Press, 2012.

[20] Isaiah Berlin. *The crooked timber of humanity: Chapters in the history of ideas*. Princeton University Press, 2013.

[21] Dan M. Kahan et al. "Motivated Numeracy and Enlightened Self-Government". In: *Behavioural Public Policy* 1.1 (May 2017), pp. 54–86.

[22] Donald Braman and Dan M Kahan. "Cultural Cognition and Public Policy". In: *Policy Review* 24 (2006), p. 25.

[23] L. A. Owens and D. S. Pedulla. "Material Welfare and Changing Political Preferences: The Case of Support for Redistributive Social Policies". In: *Social Forces* 92.3 (Mar. 1, 2014), pp. 1087–1113.

[24] Peter DeScioli et al. "Equity or Equality? Moral Judgments Follow the Money". In: *Proceedings of the Royal Society B: Biological Sciences* 281.1797 (Dec. 22, 2014), p. 20142112.

[25] Daniel Williams. "Bad Beliefs: Why They Happen to Highly Intelligent, Vigilant, Devious, Self-Deceiving, Coalitional Apes". In: *Philosophical Psychology* 36.4 (May 19, 2023), pp. 819–833.

[26] Daniel Williams. "The Case for Partisan Motivated Reasoning". In: *Synthese* 202.3 (Sept. 6, 2023), p. 89.

[27] David Pinsof, David O. Sears, and Martie G. Haselton. "Strange Bedfellows: The Alliance Theory of Political Belief Systems". In: *Psychological Inquiry* 34.3 (July 3, 2023), pp. 139–160.

[28] Maarten A Hajer. *The politics of environmental discourse: Ecological modernization and the policy process*. Clarendon Press, 1995.

[29] Arjen Boin, Paul 'T Hart, and Allan McConnell. "Crisis Exploitation: Political and Policy Impacts of Framing Contests". In: *Journal of European Public Policy* 16.1 (Jan. 2009), pp. 81–106.

[30] Robert M. Entman. "Framing: Toward Clarification of a Fractured Paradigm". In: *Journal of Communication* 43.4 (Dec. 1, 1993), pp. 51–58.

[31] Sarah Dillon and Claire Craig. *Storylistening: Narrative evidence and public reasoning*. Routledge, 2021.

[32] Teun A Van Dijk et al. "What is political discourse analysis". In: *Belgian journal of linguistics* 11.1 (1997), pp. 11–52.

[33] Paul Cairney. *Understanding Public Policy: Theories and Issues*. Houndmills, Basingstoke, Hampshire ; New York: Palgrave Macmillan, 2012. 327 pp.

[34] William Blomquist. "Beneath the Surface: Complexities and Groundwater Policy-Making". In: *Oxford Review of Economic Policy* 36.1 (Jan. 6, 2020), pp. 154–170.

[35] E. E. Schattschneider. *Politics, Pressure and the Tariff*. New York: Prentice-Hall., 1935.

[36] Warren Musgrave. "Historical Development of Water Resources in Australia". In: *Water Policy in Australia: The Impact of Change and Uncertainty*. Ed. by Lin Crase. Routledge, 2008.

[37] J. G. Tisdell, John Ward, and Tony Grudzinski. *The Development of Water Reform in Australia*. Clayton, Vic.: CRC For Catchment Hydrology, 2002.

[38] David Mair et al. *Understanding Our Political Nature: How to Put Knowledge and Reason at the Heart of Political Decision-Making* : Luxembourg: Publications Office of the European Union, 2019.

[39] Elizabeth A. Shanahan, Michael D. Jones, and Mark K. McBeth. "Policy Narratives and Policy Processes: Shanahan/Jones/McBeth: Narratives and Policy Processes". In: *Policy Studies Journal* 39.3 (Aug. 2011), pp. 535–561.

[40] Maarten Hajer. "A Frame in the Fields: Policymaking and the Reinvention of Politics". In: *Deliberative Policy Analysis*. Ed. by Maarten A. Hajer and Hendrik Wagenaar. 1st ed. Cambridge University Press, May 15, 2003, pp. 88–110.

[41] Paul A. Sabatier. "An Advocacy Coalition Framework of Policy Change and the Role of Policy-Oriented Learning Therein". In: *Policy Sciences* 21.2-3 (1988), pp. 129–168.

[42] David A Snow, Robert D Benford, et al. "Ideology, frame resonance, and participant mobilization". In: *International social movement research* 1.1 (1988), pp. 197–217.

[43] H Peyton Young. *Equity: in theory and practice*. Princeton University Press, 1995.

[44] Joseph Heath. *Cooperation and social justice*. University of Toronto Press, 2022.

[45] Sarah F. Brosnan and Frans B. M. De Waal. "Evolution of Responses to (Un)Fairness". In: *Science* 346.6207 (Oct. 17, 2014), p. 1251776.

[46] Sarah F. Brosnan. "Justice- and Fairness-Related Behaviors in Nonhuman Primates". In: *Proceedings of the National Academy of Sciences* 110 (supplement_2 June 18, 2013), pp. 10416–10423.

[47] Shinya Yamamoto and Ayaka Takimoto. "Empathy and Fairness: Psychological Mechanisms for Eliciting and Maintaining Prosociality and Cooperation in Primates". In: *Social Justice Research* 25.3 (Sept. 2012), pp. 233–255.

[48] Randall S Peterson. "The role of values in predicting fairness judgments and support of affirmative action". In: *Journal of Social Issues* 50.4 (1994), pp. 95–115.

[49] T. McEnery and A. Wilson. *Corpus Linguistics: An Introduction*. Edinburgh Textbooks in Empirical Linguistics. Edinburgh University Press, 2001.

[50] P. Baker. *Using corpora in discourse analysis*. Continuum, 2006.

[51] Henry G Widdowson. "The theory and practice of critical discourse analysis". In: *Applied Linguistics* 1 (1998), pp. 136–151.

[52] Paul Baker. "Acceptable Bias? Using Corpus Linguistics Methods with Critical Discourse Analysis". In: *Critical Discourse Studies* 9.3 (Aug. 2012), pp. 247–256.

[53] M Stubbs. *Texts and Corpus Analysis*. Blackwell, 1996.

[54] Paul Baker. *Sociolinguistics and Corpus Linguistics*. Edinburgh University Press, 2010.

[55] David M Blei, Andrew Y Ng, and Michael I Jordan. "Latent dirichlet allocation". In: *Journal of machine Learning research* 3.Jan (2003), pp. 993–1022.

[56] friendlyjordies. *Blood Water: the war for Australia's water*. July 2021.

[57] Zachary Bischoff-Mattson and Amanda H. Lynch. "Adaptive Governance in Water Reform Discourses of the Murray–Darling Basin, Australia". In: *Policy Sciences* 49.3 (Sept. 2016), pp. 281–307.

[58] Australian Water Partnership and World Bank. *Valuing Water: The Australian Perspective. Lessons from the Murray-Darling Basin*. Australian Water Partnership, Canberra, and World Bank, Washington, DC, 2022.

[59] FB Haigh. "Irrigation Potential and Problems". In: *Water Resources, Use and Management: Proceedings of a Symposium Held at Canberra by the Australian Academy of Science*. Ed. by ES Hills. Melbourne University Press, 1964, pp. 429–437.

[60] Christopher Achen and Larry Bartels. *Democracy for realists: Why elections do not produce responsive government*. Princeton University Press, 2017.

[61] Ray Smith. "An Overview of the Tesseract OCR Engine". In: *ICDAR'07: Proceedings of the Ninth International Conference on Document Analysis and Recognition*. Washington, DC, USA: IEEE Computer Society, 2007, pp. 629–633.

[62] L. Parry and R. Marsh. *Equity, Fairness and Justice in Murray Darling Basin Water Policy: Results of a Q-Methodology Study*. in press. Canberra: Watertrust Australia, 2025.

[63] Hinrich Schütze, Christopher D Manning, and Prabhakar Raghavan. *Introduction to information retrieval*. Vol. 39. Cambridge University Press Cambridge, 2008.

[64] Mathew Gillings, Mark Learmonth, and Gerlinde Mautner. "Taking the Road Less Travelled: How Corpus-Assisted Discourse Studies Can Enrich Qualitative Explorations of Large Textual Datasets". In: *British Journal of Management* (2024).

[65] Gavin Brookes and Tony McEnery. "The utility of topic modelling for discourse studies: A critical evaluation". In: *Discourse Studies* 21.1 (2019), pp. 3–21.

[66] Costas Gabrielatos. "Keyness analysis: Nature, metrics and techniques". In: *Corpus approaches to discourse*. Routledge, 2018, pp. 225–258.

[67] Kenneth Benoit et al. "quanteda: An R package for the quantitative analysis of textual data". In: *Journal of Open Source Software* 3.30 (2018), p. 774.

[68] Kohei Watanabe and Baturo Alexander. "Seeded Sequential LDA: A Semi-Supervised Algorithm for Topic-Specific Analysis of Sentences". In: *Social Science Computer Review* 42.1 (2023), pp. 224–248.

[69] Frederic R Hopp et al. "The extended Moral Foundations Dictionary (eMFD): Development and applications of a crowd-sourced approach to extracting moral intuitions from text". In: *Behavior research methods* 53 (2021), pp. 232–246.

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