Adaptive Management in Water Law: Evaluating Australian (New South Wales) and Canadian (British Columbia) Law Reform Initiatives

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Sub-national jurisdictions are undertaking law reform that attempts to remedy the historic inflexibility in water law and to provide security in water use entitlements. These reforms respond to increasing hydrological variability in many watersheds where the volume of water available for consumption at the times of highest demand is decreasing and minimum environmental flows are a precursor to healthy ecological systems. Adaptive management is a foundational ecological and ecosystem-based management principle. Scholars and professionals from myriad disciplines are calling for legal and policy structures that allow adaptive environmental management regimes based on evolving watershed conditions. Adaptive management in a water context requires integrated decision-making that incorporates land use decisions with decisions about surface and groundwater, provision for minimum environmental flows, and the ability to alter water users' entitlements when a water resource is either over-allocated or changing flow regimes results in insufficient water. The purpose of this paper is to compare the water law reforms of the state of New South Wales in Australia and the province of British Columbia in Canada as they attempt to incorporate legal and management tools for adaptive management and to address fixed entitlements for water use in favour of more responsive and watershed-specific management approaches. In New South Wales, adaptation in water law is based on a watershed plan and allocation of a fluctuating consumptive pool of water, which is the amount of water available for extraction under licence after environmental needs are taken into account. In British Columbia, the provincial government may adapt water licences over time through water sustainability planning and water licence review, as well as issue short-term orders restricting water diversions without needing to compensate licence holders for any damages flowing from these orders. These reforms are leading the restructuring of water law to address conflicts between water users as well as between water users and the environment. These reforms are also at the forefront internationally as models for adaptive management. They provide some flexibility in accommodating environmental flows but decrease certainty for water users as hydrological systems change. Their relative successes in accounting for adaptation and healthy hydrological systems will be instructive to other jurisdictions as they move to align their water laws with principles of adaptive management.

Titre francophone : Gestion adaptative dans les législations relatives à l'eau : Évaluation des initiatives de réforme législative en Australie (Nouvelle-Galles du Sud) et au Canada (Colombie-Britannique)

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Les juridictions infranationales entreprennent des réformes législatives qui tentent de rectifier l'inflexibilité historique des législations relatives à l'eau et d'offrir de la sécurité quant aux prestations d'utilisation d'eau. Ces réformes répondent à l'augmentation de la variabilité hydrologique dans plusieurs bassins versants dans lesquels il y a une diminution du volume d'eau disponible pour la consommation lorsque la demande est la plus élevée et dans lesquels des flux environnementaux minimaux portent atteinte à des systèmes écologiques sains. La gestion adaptative est un principe fondamental de gestion écologique axé sur des écosystèmes. Des chercheurs et des professionnels d'une multitude de disciplines demandent des structures législatives et politiques qui permettent d'établir des régimes de gestion environnementale adaptative basés sur les conditions évolutives des bassins hydrologiques. La gestion adaptative dans un contexte hydrologique requiert un processus décisionnel intégré qui incorpore, d'une part, des décisions quant à l'usage de terres et, d'autre part, des décisions quant aux eaux de surface et souterraines, des provisions pour des flux environnementaux minimaux et la possibilité d'altérer les prestations d'utilisation d'eau lorsqu'une ressource d'eau est assujettie à des prélèvements excessifs ou lorsque des changements aux régimes de flux engendrent des insuffisances en eau. L'objectif de cet article est de comparer les réformes législatives quant à l'eau de l'État de Nouvelle-Galles du Sud, en Australie, et de la province de Colombie-Britannique, au Canada, dans leur tentative d'incorporer des outils juridiques et de gestion et de rectifier les prestations fixes pour l'utilisation d'eau au profit d'approches de gestion plus sensibles et spécifiques aux bassins hydrologiques. En Nouvelle-Galles du Sud, l'adaptation en droit relatif à l'eau est basée sur un plan de bassins hydrologiques et sur l'allocation d'une consommation fluctuante d'un bassin d'eau ce qui correspond à la quantité d'eau disponible suite à l'extraction sous licence après que les besoins environnementaux aient été considérés. En Colombie-Britannique, le gouvernement provincial peut adapter les permis d'utilisation d'eau au fil du temps par une planification axée sur la durabilité des ressources hydrologiques et des révisions des permis, ainsi que par la promulgation d'ordres à court terme visant à restreindre les détournements d'eau sans que les détenteurs de permis doivent être compensés pour les préjudices découlant desdits ordres. Ces réformes sont à la tête de la restructuration de la législation relative à l'eau afin d'adresser des conflits parmi les utilisateurs d'eau ainsi qu'entre les utilisateurs d'eau et l'environnement. Ces réformes sont également à l'avant-garde à l'international et servent de modèles pour la gestion adaptative. Elles offrent de la flexibilité en accommodant les flux environnementaux, mais diminuent la certitude des utilisateurs d'eau face aux changements dans les systèmes hydrologiques. Les succès relatifs de ces réformes dans la prise en considération de l'adaptation et des systèmes hydrologiques enrichiront le travail d'autres juridictions dans leur tentative d'aligner leurs législations relatives à l'eau avec les principes de gestion adaptative.

> It is now universally accepted that water is an essential primary natural resource upon which nearly *all* social and economic activities and ecosystem functions depend.[1]

1. INTRODUCTION

The Cowichan River (the "River"), a Canadian Heritage River in southwestern British Columbia (BC), is emblematic of the confluence of issues replicated in watersheds across the globe at many scales. Just 47 kilometres long, it sustains three different species of salmon, many other fish and fauna, the most populous First Nation in British Columbia, recreation and food tourism, and a logging industry.[2] Since 1956, staff for Catalyst Paper Corporation, which operates a pulp and paper mill with water from the River, have managed river flows at certain times of the year by opening and closing the weir situated between Cowichan Lake and the River. While low flows in September have often been a concern for the migration of salmon upriver to spawn, the more extreme low flows in recent years threatens the survival of these fish and the cultural and sustenance activities associated with them.[3] In some

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1 United Nations World Water Assessment Programme, The UN World Water Development Report 2015: Water for a Sustainable World, (Paris, France: UNESCO, 2015) at 9.

2 See British Columbia, Madrone Environmental Services Ltd and Cowichan Valley Regional District, *The Cowichan: A Canadian Heritage River 10 Year Monitoring Report 2003-2013,* December 2013*,* online: <www.env.gov.bc.ca/bcparks/heritage_rivers_program/reports/cowichan-rv-monitoring-report.pdf>.

3 Rodger Hunter et al, *The Cowichan Watershed Board: An Evolution of Collaborative Watershed Governance* (Victoria: POLIS Project on Ecological Governance, University of Victoria, 2014) at 5. See generally

years, Cowichan Tribes' staff and members have resorted to catching salmon and transporting them upstream in trucks past the areas of the River where fish passage is impossible during critically low flows.[4] While there is no simple response to the complexity of water diversions for agricultural, domestic, and industrial uses, one proposed solution is to raise the level of the weir to hold back more water in Cowichan Lake during the summer to provide more water for release into the River in September. However, riparian landowners oppose this proposal, citing the unacceptable consequences of longer inundation of the Cowichan Lake foreshore.[5] It is clear that a change in the approach to water diversions and land management is needed. However, the complexity of historic water and land use patterns makes the path to adaptive management unclear.

Adaptive management is derived from the principle of adaptation, a foundational ecological and ecosystem-based management principle. Ecologists, other scientists, and resource management scholars and practitioners are calling for legal and policy structures that allow adaptive regimes for environmental management based on evolving regional or watershed ecological conditions. In particular, the water balance[6] in many regions is changing rapidly and a variety of sectors point to the growing impact of climate change in creating more severe weather conditions such as drought, intense storm events, and drier summers.[7] In this context of increasing uncertainty, adaptive management in a water law context requires integrated decision making that takes multiple ecosystem parameters into account, such that consideration of an application for a water licence or subdivision would involve evaluating impacts on land uses, surface and groundwater, and minimum environmental flows.[8] This

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Amy Smart, "Cowichan Anxious to Solve a Drying River", *Times Colonist* (19 July 2015), online: <www.timescolonist.com/news/local/cowichan-anxious-to-solve-a-drying-river-1.2005490>.

4 See Hunter et al, *supra* note 3 at 5; Mark Hume, "How Do We Fight Disappearing Rivers?", *Globe and Mail* (20 October 2007), at paras 3, 11, online: <www.theglobeandmail.com/news/national/how-do-we-fight-disappearing-rivers/article1327569/>.

5 See e.g. *Weir v Deputy Comptroller of Water Rights* (April 14-17 and June 3-5 2014), 2013-WAT-013(b), 015(c), 016(b), 017(c), 018(c) and 019(c).

6 "A water budget, hydrologic budget, or water balance is a measurement of the continuity of the flow of water through a system or control volume" (Larry W Mays, *Water Resources Engineering*, 2nd Ed (Hoboken, NJ: John Wiley & Sons, 2011) at 41). These terms refer to the input of water into a spatial unit, such as a watershed, in relation to the output from that system. Water balance models calculate runoff for water yield, streamflow, groundwater recharge, and flood estimation, as well as management decision-making and water planning.

7 The Intergovernmental Panel on Climate Change has documented these impacts extensively (see generally ML Parry et al, eds, *Climate Change 2007: Impacts, Adaptation and Vulnerability* (Cambridge, UK: Cambridge University Press, 2007)). Different sectors, from tourism to real estate, have also identified future impacts and risks to their operations (see e.g., Daniel Scott, Colin Michael Hall & Stefan Gössling, *Tourism and Climate Change: Impacts, Adaptation and Mitigation* (New York: Routledge, 2012); Nicholas Heap, *Hot Properties: How Global Warming Could Transform BC's Real Estate Sector* (Vancouver: David Suzuki Foundation, 2007); Evan Mills, *From Risk to Opportunity: Insurer Responses to Climate Change* (Boston: Ceres, 2009); Institute for Catastrophic Loss Prevention, *Telling the Weather Story* (Toronto: Insurance Bureau of Canada, 2012).

8 We use the term "integrated" here to refer to decision-making about the environment that evaluates impacts on the whole system and beyond the specific ecosystem feature at issue (land or water) — for example, the entire hydrological system of interconnected surface and groundwater. While this discussion is limited to the expression of integrated decision-making in law, it is well canvassed in the integrated

integrated decision making also necessitates the ability to alter water users' entitlements when a water resource is either over-allocated or changing flow regimes result in not enough water to go around.

Historically, water law regimes have not provided tools for adaptive management, as they were designed in a water management era focused on providing water users with security of water use and facilitating development. Under these historical regimes, decision making was not integrated across surface and groundwater systems. Dominated by the ethos of the Cowboy-throughput economy, water law "defined beneficial use in terms of diversion of water out of streams and considered water left in a stream as effectively wasted" without sufficient water allocated to the environment.[9] Similarly, there were no means to reallocate or reduce water entitlements, short of government expropriating water "rights" or reducing licenced entitlements. While the resulting legal rigidity of fixed entitlements and property-like rights to take a specified volume of water gave the appearance of providing certainty to water licensees, the structure is antithetical to very nature of ecological adaptation.

Jurisdictions are undertaking law reform that attempts to remedy this historic inflexibility in water management, recognizing that in many hydrological systems the volume of water available for consumption is decreasing at the times of highest demand, and that minimum environmental flows are a precursor to a healthy ecological system. For example, confronted with the adaptive management imperative posed by ongoing cycles of drought, Australian jurisdictions have been in various stages of this reform process for over a decade. In 2000, the state of New South Wales (NSW) replaced its *Water Act* 1912 with a modern water law regime enacted through the *Water Management Act* 2000 that incorporated several adaptive management tools designed to ensure the health of surface and groundwater systems.[10] A major amendment to the *Water Management Act* 2000 in 2004 and the passage of Commonwealth legislation in 2007 [the *Water Act* 2007 (Cth)],[11] designed to provide interjurisdictional integration of water management across the Murray-Darling Basin (MDB), have further strengthened the adaptive capacity of NSW's water regime. In Canada, the most recent example of creating an adaptable regime is in BC where the provincial government finally reformed its 105 year old *Water Act* in 2014 with the *Water Sustainability Act* (*WSA*) that emphasizes the protection of environmental flows and fish populations.[12]

The purpose of this article is to compare the regulatory approaches taken by the state of NSW in Australia and the province of BC in Canada to incorporate the tools of adaptive management and to address fixed entitlements to use water in favour of more responsive and watershed-specific management approaches.

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water resource management literature (see Wietske Medema, Brian S McIntosh & Paul J Jeffrey, "From Premise to Practice: A Critical Assessment of Integrated Water Resources Management and Adaptive Management Approaches in the Water Sector" (2008) 13:2 Ecology & Society 29).

9 Joseph Sax. "The Constitution, Property Rights and the Future of Water Law" (1990) 61 U Colo L Rev 257 at 258.

10 *Water Act 1912* (NSW) [*Water Act 1912*]; *Water Management Act 2000* (NSW) [*WMA* 2000].

11 *Water Act 2007* (Cth).

12 The BC legislature enacted the original *Water Act* in 1909, SBC 1909 c 48, the most recent version of which was the *Water Act*, RSBC 1996, c 483A [*Water Act*]. The *Water Sustainability Act*, SBC 2014, c 15 [*WSA*], brought into force 29 February 2016.

These jurisdictions are chosen for two reasons. First, the historic origins of the water law regimes in Australia and western North America are similar.[13] These regimes originated from land development pressures associated with the mining industry and the desire to settle agricultural populations in the mid-nineteenth century.[14] They also began with the common law rules received from England—riparian rights and the rule of capture—before sub-national governments adopted statutory regimes early in the mid-1800's to early 1900's to licence water allocations.[15] The second reason for choosing to compare the recent water law reforms in the jurisdictions of NSW and BC is that both jurisdictions have introduced modern water legislation designed to address the imperative of adaptive management—adopting mechanisms to integrate water management and land use decision making, protect environmental flows, and deliver flexibility in water diversions under licence.

Notwithstanding these similarities, in important respects these jurisdictions have taken different approaches to law reform. Notably, while each jurisdiction makes provision for integrated decision making through statutory water plans, in NSW water plans are mandatory and comprehensive while in BC water plans are only prepared on order of the Minister, and their contents may vary.[16] In NSW, environment flows are protected by way of committed environmental water and specified environmental rules within the mandatory plans.[17] Beginning in 2019, sustainable diversion limits (SDLs) will also apply to water resources within the MDB in NSW.[18] Conversely, BC requires decision makers to consider environmental flow needs when evaluating water licence applications and enables statutory decision makers to make temporary orders in times of low flows.[19] In addition, in many respects NSW is much further down the reform stream, although the comprehensive nature of the reforms means that it is still in the implementation stage. Further, in comparison to BC's reforms, NSW's approach to meeting the adaptive management imperative has been more immediate and aggressive because of its much drier climate. The national Commonwealth government also has played a key role in leading water reform initiatives in Australia and providing financial support. Finally, while both the NSW and BC water regimes provide the flexibility to allow for changes in volumetric water allocation under water entitlements, NSW achieves this by providing a secure right to a share of the consumptive pool in a specified water resource,[20] while BC allows for amendment of volumetric licenses, albeit after a 30 year wait or through water sustainability planning.[21]

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13 Brian Richter, *Chasing Water: A Guide for Moving from Scarcity to Sustainability* (Washington: Island Press, 2014) at 122.

14 For a discussion of the history of water law in Australia, see Good National Water Commission, *Water Markets in Australia: A Short History* (Canberra: National Water Commission, 2011) at 19–20 [NWC, *Water Markets*]. For BC, see Nigel D Bankes, "The Board of Investigation and the Water Rights of Indian Reserves in British Columbia, 1909-1926" in Kerry Abel & John Friesen, eds, *Aboriginal Resource Use in Canada: Historical and Legal Aspects* (Winnipeg: University of Manitoba Press, 1991) 219 at 219–226.

15 See NWC, *Water Markets*, *supra* note 14; Bankes, *supra* note 14 at 220; William S Armstrong, "The British Columbia Water Act: The End of Riparian Rights" (1962) 1 UBC L Rev 583 at 583–584.

16 See *WMA 2000*, *supra* note 10 at ss 15–49; *WSA*, *supra* note 12, ss 64–75.

17 See discussion on environmental flows at section 3.3.2 below.

18 See *Water Act 2007 Basin Plan* (Cth), s 9.14 [*Basin Plan*].

19 See discussion on environmental flows at section 4.3.2 below.

20 See *WMA 2000*, *supra* note 10, s 56(1).

21 See *WSA*, *supra* note 12, ss 23, 79. See also the accompanying discussion in *infra* note 280.

Ultimately, NSW and BC are useful comparators as they are both subnational jurisdictions that are leaders in designing water regimes that incorporate some essential features of adaptive management, and have done so relatively recently in the context of colonial regulatory water management. Therefore, the contrast between the approaches taken in NSW and BC offers water scholars and managers instructive options for water law reform.

Part 2 of this paper briefly canvases the evolving discussion of the need for adaptive management in legal regimes. Within that framework, part 3 and part 4 set out the context and historical development of colonial water law in NSW and BC, respectively. The term "colonial water law" means laws enacted by state, provincial or federal governments and is used in contrast to indigenous or Aboriginal water laws of indigenous communities in Australia and Canada, which are a developing influence on colonial water law.[22] Each part details the law reform initiatives and explains how these reforms respond to the elements of adaptive management—integrated decision making, minimum environmental flows, and the flexibility to allow changes in volumetric entitlements.[23]

2. THE ADAPTIVE MANAGEMENT IMPERATIVE

Adaptive management, now a key part of some contemporary natural resources management regimes,[24] has long been defined as a systemic and integrated approach to management and change that applies the learning from management policies and practices.[25] As an ecological

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22 The *Constitution Act 1982* recognizes and affirms existing Aboriginal and treaty rights in Canada (*Constitution Act,* 1982, s 35, being Schedule B to the *Canada Act 1982* (UK), 1982, c 11). In addition, indigenous communities in Canada continue to define and use their own laws, which include water laws. See e.g. Val Napoleon, "Living Together: Gitksan Legal Reasoning as a Foundation for Consent" in Jeremy Webber & Colin McLeod (eds), *Challenges of Consent: Consent as the Foundation of Political Community in Indigenous/Non-Indigenous Contexts* (Vancouver: UBC Press, 2009) 45; John Borrows, "Indigenous Legal Traditions in Canada" (2005) 19:1 Wash U J L & Pol'y 167; Yinka Dene 'Uza'hne, "Surface Water Management Policy" (2016), online: <www.carriersekani.ca/images/docs/Yinka%20Dene%20'Uzah'ne%20Surface%20Water%20Management%20Policy%20%28March%2018%202016%29%20%2800303183xC6E53%29.pdf>.

23 Definitions of newer terminology related to the water management approaches described in this paper include: use entitlements (a generic term for licenses or other permits that allow the use of water, whether or not they are a water right), volumetric entitlements (the amount of water that a licensee or permit holder is entitled to use), integrated statutory water plans (water plans mandated by statute that take an integrated water resource management approach), share-based water entitlements (a use entitlement based on a percentage or share of the available water), sustainable diversion limits (the total amount of water that can be diverted from a watercourse that leaves it with proper functioning condition), and environmental water (the water that remains *in situ* to fulfill ecological functions).

24 See generally Jaroslav Mysiak et al, eds, *The Adaptive Water Resource Management Handbook* (London: Earthscan, 2010); Derek Armitage, Fikret Berkes & Nancy Doubleday, eds, *Adaptive Co-Management* (Vancouver: UBC Press, 2007); JB Ruhl, "Regulation by Adaptive Management: Is it Possible?" (2005) 7:1 Minn J L Sci & Tech 21; Kai N Lee & Jody Lawrence, "Adaptive Management: Learning from the Columbia River Basin Fish and Wildlife Program" (1986) 16 Envtl L 431.

25 The classic text cited as the foundation for adapative management is C S Holling et al, *Adaptive Environmental Assessment and Management* (New York: John Wiley and Sons, 1978). For the discussion of the practice see Craig R Allen & Lance Gunderson, "Pathology and Failure in the Design and Implementation of Adaptive Management" (2011) 92 J Environmental Management 1379–1384 at 1384–1385.

principle from evolutionary biology, it is applied to resource management in recognition that our understanding of most natural systems is incomplete; natural systems change over time and complex socio-ecological systems require proactive, flexible and experimental approaches to management. The focus in the management context is on the feedback loop of "learning by doing."[26] A policy or management choice is implemented, monitored and then adapted to fit changing socio-ecological systems. Notably, it is not just on-the-ground management decisions for ecosystems that are subject to alteration, but policies and laws also require ongoing adaptation to account for system change.[27] Changing community goals and expectations also direct what policy or management choices are appropriate in relation to the environment.[28] The institutions that are responsible for making decisions about socio-ecological systems include laws, and they too are subject to this iterative approach to ecosystem-base management.[29]

Adaptive management is premised on the understanding that there is no longer a presumed steady state or "stationarity" for most natural systems within the environment.[30] Moreover, even if such a stationarity were to exist within natural systems, the interactions between ecological processes and human activities, or socio-ecological systems, often create effects from which no "baseline" ecological outcomes can be predicted. Integrally related to adaptive management and the continually changing state of ecosystems is resilience theory, which seeks to incorporate this uncertainty of outcome into complex adaptive systems and the governance of those systems.[31]

The lack of stationarity and certainty in natural systems has fundamental legal implications for law as water law grants entitlements to use the environment, such as a volume of water per year, based on a static assessment of ecological conditions. Traditionally, water law regimes and their day-to-day expression through licenced uses, rarely monitored or assessed the impact of such use on the health of ecosystems as it was occurring.[32] Rather, the potential impacts of water diversions were typically evaluated up front through an application process for a water

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26 This is characterized as "active adaptation" in Carl Walters & CS Holling, "Large-scale Management Experiments and Learning by Doing" (1990) 71:6 Ecology 2060 at 2060–2061.

27 See Ahjond Garmestani, Craig Allen & Heriberto Cabezas, "Panarchy, Adaptive Management and Governance: Policy Options for Building Resilience" (2009) 87:4 Neb L Rev 1036.

28 See Phillip Pagan & Lin Crase, "Property Right Effects on the Adaptive Management of Australian Water" (2005) 12:2 Australian J Environmental Management 77 at 77.

29 See generally Ignacio Porzecanski, Lynn Saunders & Mark Brown, "Adaptive Management Fitness of Watersheds" (2012) 17:3 Ecology & Soc 29.

30 See generally PCD Milly et al, "Stationarity Is Dead: Whither Water Management?" (2008) 319:5863 Science 573.

31 For a thorough consideration of these dynamics within the framework of law, see Ahjond Garmestani et al, *Social-Ecological Resilience and the Law* (New York: Columbia University Press, 2014). See also Carl Folke et al, "Adaptive Governance of Socio-Ecological Systems" (2004) 30 Annual Rev Environment & Resources 441 at 445.

32 For example, historically, there was no ability under the BC *Water Act*, *supra* note 12, to revise a license unless there was an error in the original license. The licensee applied to have the license revised in some way, or to remove a provision that is inconsistent with the Act (s 18(1) of previous versions of the Act). More broadly and particularly in the United States, water is viewed as a kind of property right; see Lawrence J Macdonnell, "Prior Appropriation: A Reassessment" (2015) 18:2 Water L Rev 228 at 291-292.

licence or development, or enforced through penalties or suspension or cancellation of licences after harm has occurred. While designed to provide certainty and security to licenced users, this approach presents few opportunities to assess the impact of laws allowing for the granting of entitlements to take a specified volume of water and to adapt those entitlements to changing socio-ecological conditions.

For the past twenty years, legal scholars have explored the principles of adaptive management in a variety of contexts from administrative law to resource management.[33] In the context of resource management, a general consensus has developed among legal scholars that the traditional legal approach to water resource management is not flexible enough to allow for meaningful adaptive management and promotion of resilience.[34] Two primary criticisms are that traditional legal regimes are premised on an ecological steady state within legal, not ecological, boundaries,[35] and the legal regimes are too inflexible to respond in a timely manner to environmental change.[36]

In the water law context, climate change is named as a key driver of the need for adaptive management,[37] which include legal and governance approaches to water management that allow for water use entitlements to change over time depending on seasonal and inter-annual hydrology. While scholars have prescribed a variety of key attributes for legal regimes that

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[33] In the administrative law context, see Robin Kundis, William Leary & JB Ruhl, "Designing Administrative Law for Adaptive Management" (2014) 67:1 Vand L Rev 1; In water law, see Craig Anthony Arnold, "Adaptive Water Law" (2014) 62 U Kan L Rev 1043; Carl Bruch & Jessica Troell, "Legalizing Adaptation: Water Law in a Changing Climate" (2011) 36:7 Water Intl 828; Patricia Hania, "Climate Change and the Protection of Drinking Water in Ontario: An Opportunity to Adopt Adaptive Management?" (2011) 22 J Envtl L & Prac 167; Robin Craig, "Adapting Water Federalism to Climate Change Impacts: Energy Policy, Food Security and the Allocation of Water Resources" (2010) 5 Envtl & Energy L & Pol J 183. See generally JB Ruhl, "Panarchy and the Law" (2012) 17:3 Ecology & Society 31; Melinda Benson & Ahjond Garmestani, "Can We Manage for Resilience? The Integration of Resilience Thinking into Natural Resource Management in the United States" (2011) 48 Environmental Management 392; JB Ruhl, "Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law" (1997) 34:4 Hous L Rev 933 [Ruhl, "Thinking";].

[34] See Ruhl, "Thinking," *supra* note 33 at 968–975; Craig Allen et al, "Panarchy: Theory and Application" (2014) 17 Ecosystems 578 at 581; Barbara Cosens & Mark Williams, "Resilience and Water Governance: Adaptive Governance in the Columbia River Basin" (2012) 17:4 Ecology & Society 3; A Dan Tarlock, "Prior Appropriation: Rule, Principle or Rhetoric?" (2000) 76 NDL Rev 881 at 891–892.

[35] See Milly et al*, supra* note 30; Arnold*, supra* note 33; Claudia Pahl-Wostl et al, "Managing Change toward Adaptive Water Management through Social Learning" (2007) 12:2 Ecology & Society 30. See generally Jonas Ebbesson & Carl Folke, "Matching Scales of Law with Social-Ecological Contexts to Promote Resilience" in Ahjond S Garmestani and Craig R Allen, eds, *Social-Ecological Resilience and Law* (New York: Columbia University Press, 2014) 265 at 268–269.

[36] See Arnold, *supra* note 33 at 1043 and 1057; Pahl-Wostl et al, *supra* note 35; Ruhl, "Thinking", *supra* note 33 at 996; David R Percy, "The Limits of Western Canadian Water Allocation Law" (2004) 14 J Envtl L & Prac 315.

[37] See Carl Bruch & Jessica Troell, "Legalizing Adaptation: Water Law in a Changing Climate" (2011) 36:7 Water Intl 828; Craig Anthony Arnold, "Adaptive Watershed Planning and Climate Change" (2010) 5:2 Environment & Energy L & Pol J 417.

promote adaptive water management,[38] there is consensus that they must include the following key characteristics: integrated decision making, protection of environmental flows, and flexibility to amend volumetric entitlements.

Integrated decision making in this context refers to a scale of water governance in which the entire hydrological cycle is accounted for, and where decisions about land uses are linked to their impacts on water flows and quality. This means regulating both ground and surface water as connected parts of one hydrological system, and ensuring that decisions about one include an assessment of the effect of such decision on the other. In addition, integrated decision making flows from watershed-specific planning that evaluates land use decisions as they affect hydrology. Adaptive water management law also requires that environmental flows, meaning the water needed to maintain a healthy riparian ecosystem, are protected before water diversion is allowed.[39] As a relatively new concept in water law, environmental flow regulations typically specify an amount of water that must remain in the watercourse as a precursor to diverting water.[40] Finally, given that environmental flow needs, hydrology, and water values change over time—with climate change exacerbating the rate of change—use entitlements must also be adaptable. An adaptive water law regime requires flexibility to evaluate and amend volumetric entitlements to divert water under licence, or make water entitlements subject to specified but changing minimum ecological and other conditions.

Considering these key characteristics in the context of contemporary water law regimes, in particular to the recent law reforms in NSW, Australia and BC, Canada, can assist in evaluating how well current thinking on adaptive management in water law is being implemented in jurisdictions where water shortages are either acute or of concern.

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38 See e.g. Arnold, *supra* note 33 at 1070–1081 (shared risk, conditional and flexible standards, and integrated water governance); Andreas M Keessen & Helena FMW van Rijswick, "Adaptation to Climate Change in European Water Law and Policy" (2012) 8:3 Utrecht L Rev 38 at 40–41 (multilevel governance on a bioregional scale, information and participation, flexible goals, objectives and exemptions, adaptability of rules to enable learning); Bruch & Troell, *supra* note 37 at 830 (flexible and responsive legal framework, integrated water governance structures); Bob Sandford, *Climate Change Adaptation and Water Governance: Background Report* (Vancouver: Simon Fraser University Adaptation to Climate Change Team, 2011) at 39–46 (recognize nature's need for water and water's integral role for human health, honour First Nations water ethic, promote institutional openness and jurisdictional cohesion); Ruhl, "Thinking", *supra* note 33 at 982, 986, 989–990 (nested watershed governance, legal flexibility to behave non-linearly, disturbance that stimulates learning and diversity of response; self-criticality to achieve stable disequilibrium).

39 While this characteristic of adaptive water law is so obvious one would assume it could go unstated, many jurisdictions still do not have effective environmental flow standards that mandate minimum instream hydrological conditions. For discussion of this in the North American context, see generally Linda Nowlan, "CPR for Canadian Rivers: Law to Protect and Conserve Environmental Flows in Canada" (2012) 23:3 J Envtl L & Prac 237 at 237, 282; Tom Annear et al, *Instream Flows for Riverine Resource Stewardship* revised ed (Cheyenne, WY: Instream Flow Council, 2004); Allan Locke et al, *Integrated Approaches to Riverine Resource Stewardship: Case Studies, Science, Law, People and Policy* (Cheyenne, WY: Instream Flow Council, 2008).

40 More precisely, "environmental flows describe the quantity, timing and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems". Brisbane Declaration, 10th International River Symposium and International Environmental Flows Conference, 3–6 September 2007, Brisbane, Australia. For a robust discussion of the concept of environmental flows in Canada, see Nowlan, *supra* note 39 with a discussion of definitions at 244–246.

3. NEW SOUTH WALES

3.1. Context

NSW is a large sub-national (state) jurisdiction in Australia, with a total area of 802,000 square kilometres. Located on the southeast of the Australian continent, NSW is Australia's most populous state, with a highly urbanized population of approximately 7.5 million people. NSW is home to a thriving agricultural sector whose producers grow water-intensive crops such as cotton and rice, raise cattle and sheep, and export internationally recognized wine.

NSW has a diverse range of regulated surface waters (i.e. those where flows are controlled by releases from the major rural dams) and unregulated surface water (those typically dependent on rainfall and natural river flows rather than water released from dams).[41] With high rainfall variability and the regular occurrence of extreme droughts and floods, NSW's rivers have a highly variable flow—a variability that occurs both seasonally and between years and sequences of years. NSW also has a diverse range of groundwater resources.

Between urban, agricultural, industrial, social and cultural uses and ecosystem needs, there are several competing demands on the available water resources in NSW.[42] NSW has the highest water consumption of any Australian state with the agricultural industry being the largest consumer of water in NSW. This sector alone consumed 6,210 GL of water in 2012-13.[43] Notably, in the two-year period between 2010–11 and 2012–13, the water consumed by the agriculture industry more than doubled, with irrigated water consumption for cotton and rice increasing by 108 percent and 134 percent respectively.[44] In 2012–2013, the gross value of irrigated agricultural production in NSW was approximately $3.4 billion, which equates to 25 percent of the Australian total production.[45] In that same year, the manufacturing industry, the mining industry, and households consumed 123 GL, 106 GL, and 2,503 GL of water respectively.[46] In each instance, this represents an increase in the water consumed over previous years.

Eighty percent of NSW's water resource is located within the MDB.[47] The MDB covers over 1 million square kilometers and stretches across the States of Queensland, NSW, Victoria, South Australia, and the Australian Capital Territory (ACT), and is the catchment for

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41 Over 30 major dams exist within the State to control flow and facilitate storage. Real time data for NWS's dams is available online: New South Wales, Department of Primary Industries, "State Overview of Water Flows", online: <realtimedata.water.nsw.gov.au/water.stm>.

42 See Australia, Bureau of Statistics, "State and Territory Summaries Water Account Australia 2012–2013" (2014), online: <www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/4610.0Main%20Features32012-13?opendocument&tabname=Summary&prodno=4610.0&issue=2012-13&num=&view=>.

43 See *ibid*.

44 See *ibid*.

45 See *ibid*.

46 See *ibid*.

47 See Australia, National Water Commission, *Australian Water Markets Report 2012-13*" (Canberra: NWC, 2013) at ch 4.4, online: <webarchive.nla.gov.au/gov/20160615060431/http://nwc.gov.au/> [NWC, *Australian Water Markets Report*].

Australia's three longest rivers that connect to significant groundwater systems.[48] The multi-jurisdictional management of the MDB is therefore essential to all Basin States in order to support their respective consumptive needs and to sustain dependent ecosystems and important environmental conservation sites. Of particular note are the approximately 30,000 wetlands along the MDB, of which 16 are listed as wetlands of international importance under the Ramsar Convention, and 220 are listed as of national importance.[49] The MDB is also home to over 60 species of fish, 124 families of macro-invertebrates, 98 species of water birds, and four threatened water-dependent ecological communities, and supports hundreds of plant species through key floodplains.[50]

With demand for water increasing[51] and availability of water affected by periods of prolonged drought, water management systems in NSW and throughout Australia are facing a major challenge—that of allocating an already over-allocated water resource between irrigation and other consumptive uses while ensuring sufficient water remains to support functioning ecosystems. This problem is perhaps most pronounced within the MDB, which has recently experienced some of the lowest inflows on record.[52] Within the MDB, at least 35 bird species and 16 mammal species are endangered, several native fish species are in severe decline, and significant plant species such as the river red gum are severely stressed by drought and are also in decline.[53]

Climate change is expected to exacerbate the situation, with predictions of increased temperatures resulting in higher levels of evaporation, reduced rainfall and increased rainfall variability,[54] as well as significantly increased frequency and severity of drought[55] punctuated by extreme weather events, such as flooding.[56] As the Chair and CEO of the National Water Commission, Ken Matthews, stated in 2009, "[w]e have known for years that water reform in

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48 These three rivers are the Murray, the Darling and the Murrumbidgee. The Murray River is the third longest navigable river in the world. See Australia, Geoscience Australia, "Longest Rivers" online: <www.ga.gov.au/scientific-topics/national-location-information/landforms/longest-rivers>; Discover Murray, "About the Murray River" online: <www.murrayriver.com.au/about-the-murray/>.

49 Alex Gardner, "An Overview of the Historical Legal Background to the 'Proposed Basin Plan'" (2012) 29 Environment & Planning L J 263 at 263 [Gardner, "Overview"].

50 See Australia, Murray-Darling Basin Authority, "Animals" online: <www.mdba.gov.au/discover-basin/environment/animals> [MDBA, "Animals"].

51 See New South Wales, Department of Primary Industries, "Water Management" online: <www.water.nsw.gov.au/water-management>.

52 See Australia, Department of the Environment, "Murray-Darling Basin Dry Inflow Contingency Planning February 2008" (February, 2008) online: <webarchive.nla.gov.au/gov/20130904195628/http://www.environment.gov.au/water/publications/mdb/dry-inflow-planning-feb08.html>; Australia, Murray-Darling Basin Authority, "Surface Water Inflows Timeline" online: <www.mdba.gov.au/publications/products/surface-water-inflows-timeline>. While the flooding in the Eastern States in early 2011 significantly increased the volume of water flowing in the Murray-Darling system and provided temporary relief, the intense pressure on this water resource remains.

53 See MDBA, "Animals", *supra* note 50.

54 See Christopher Field et al, eds, *Climate Change 2014: Impacts, Adaptation and Vulnerability*, (Cambridge, UK: Cambridge University Press, 2014) at 1387–1388.

55 See *ibid*; Parry et al, *supra* note 7.

56 See Field et al, *supra* note 54 at 1404.

Australia was important, pressing and difficult. Now that climate change is with us, important becomes vital, pressing becomes urgent, and difficult becomes downright tough."[57]

In response to these challenges, over the past 20 years there have been "two interactive processes of law reform flowing over NSW and the MDB".[58] The first is the reform of NSW water legislation, driven by a national water policy agenda. The second is the development of an inter-jurisdictional process to manage the MDB as a whole. Through these two processes, water management regimes are being designed to allow for adaptive management by making explicit provision for environmental water, integrated statutory water plans, and the ability to adjust the volume of water an entitlement holder is able to divert based on the water available within the system.

3.2. Historical Colonial Legal Regime

The colony of NSW originally relied on common law rules received from England. However, these rules were not well suited to the hot and arid climate of Australia.[59] Towards the end of the nineteenth century, during a period of major drought known as the Federation Drought, conflict over water grew as landholders began constructing dams and irrigation systems to secure a more reliable water supply.[60] Public inquiries conducted in each of the Australian colonies recommended the introduction of a comprehensive statutory regime to control, manage and oversee the appropriation of water resources.[61]

NSW responded by passing the *Water Act* 1912 (NSW).[62] Under this Act, the rights to the use and flow of water were vested in the Crown.[63] With limited statutory domestic and stock watering exceptions held by riparian proprietors,[64] licenses were required to construct works to conserve, irrigate, supply, or drain water or to extract groundwater by way of artesian well.[65] However, the *Water Act* 1912 (NSW) did not specify criteria to guide licensing decisions. Initially, the enjoyment of "higher" statutory rights held by riparian proprietors were accorded

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57 Ken Matthews, "Australian water reform in 2009" (address delivered at the Committee for Economic Development, Second biennial assessment of progress in implementation of the National Water Initiative, Australia, Canberra, 9 October 2009), quoted in Paul Kildea & George Williams "The Constitution and the management of water in Australia's rivers" (2010) 32 Sydney L Rev 595 at 595–596.

58 Gardner, "Overview", *supra* note 49 at 264.

59 For a discussion of the problems associated with applying the common law water regime in the Australian context, see A Gardner, R Bartlett & J Gray, *Water Resources Law* (Chatswood, NSW: LexisNexis Butterworths, 2009) at 177–181.

60 See The History of Irrigation in the NSW Murray Region, "Timeline", online: <www.irrigationhistory.net.au/timeline.asp>.

61 See Michael McKenzie, "Water Rights in New South Wales: Properly Property?" (2009) 31 Sydney L Rev 443 at 445.

62 *Water Act 1912*, *supra* note 10. This act was preceded by the *Water Rights Act* 1896 (NSW); the *Artesian Wells Act* 1897 (NSW); the *Water Rights Act* (NSW) 1902; and the *Drainage and Artesian Wells (Amending) Act* 1906 (NSW).

63 The *Water Administration Act* 1986 (NSW), ss 3, 12(1) had the effect of vesting this water in the Water Administration Ministerial Corporation rather than the Crown.

64 *Water Act 1912*, *supra* note 10, s 7; *Water Administration Act* 1986 (NSW), *supra* note 62, Schedule 2.

65 *Water Act 1912*, *supra* note 10, ss 10, 112.

significant weight in licensing decisions,[66] with allocation of water rights otherwise occurring on the basis of "equitable apportionment," variously interpreted to mean apportionment based on water received under natural conditions in previous years,[67] or within limits so as not to completely deprive a downstream user of water when it was in short supply.[68] The reasonableness of a proposed use also became relevant in licensing decisions, in light of the available water supply and demand upon it[69] and, at times, the potential adverse environment affects. [70]

Under the *Water Act* 1912 (NSW), licences were for a fixed term[71] and attached to specified land.[72] Originally these licences were granted on the basis of the area of land they were to service,[73] with annual volumetric limits and specified purposes for which the water could be used introduced for surface water licences in 1977.[74] From 1981, in addition to the volumetric allocation under each licence, in regulated rivers licence holders were notified occasionally as to the actual amount of water that could be taken out of each volumetric entitlement.[75] In 1984 a policy was adopted extending volumetric limits to all licences, except those where the water was used to meet domestic and stock requirements. In accordance with the same policy, conditions were attached to all bore (or well) licences allowing the volumetric allocation (i.e., the rate at which the allocation was taken) to be varied at any time.[76] Through these changes, NSW incrementally built several adaptive management measures into the *Water Act* 1912 (NSW).

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66 *Robson v Water Conservation and Irrigation* (1957), 36 NSW LVR 57 at 60, cited in Andrew Dragun & Victor Gleeson, "From Water Law to Transferability in New South Wales" (1989) 29 Nat Resources J 645 at 652. See also *Bathurst Pastures Protection Bd v Kyalla Inv Co* (1942), 21 NSW LVR 8, cited in Dragun & Gleeson, *supra* note 66 at 652. For a discussion of licensing practices under the *Water Act 1912* (NSW), see Dragun & Gleeson, *supra* note 66 at 652–656.

67 See *Trustees of the Estate of Late Smith Pollock and Others v Considine* (1941), NSW LVR 80, cited in Dragun & Gleeson, *supra* note 66.

68 See Dragun & Gleeson, *supra* note 66.

69 See e.g. *Water Conservation and Irrigation Commission v New South Wales Pastoral Co Ltd* (1945), 24 NSW LVR 54, cited in Dragun & Gleeson, *supra* note 66.

70 See e.g. *FW Hughes Pty Lt. v Water Conservation and Irrigation Commission* (1937), 16 NSW LVR 11, cited in Dragun & Gleeson, *supra* note 66; *Thorpes Ltd v Water Conservation and Irrigation Commission* (1957), 36 NSW LVR 62, cited in Dragun & Gleeson, *supra* note 66 at 654–656.

71 *Water Act 1912*, *supra* note 10, s 12(1)(b) (these licences could be renewed from time to time (*ibid,* s 14), amended (*ibid,* s 13AA) or cancelled with notice if not used within three years (*ibid,* s 13F)).

72 See Janice Gray, "Legal Approaches to the Ownership Management and Regulation of Water from Riparian Rights to Commodification" (2006) 1 Transforming Cultures 64 at 82. See also *Water Act 1912*, *supra* note 10, ss 16, 20F (which requires all licenses, authorities for joint supply schemes, high flow licenses and high flow authorities be attached to specified land).

73 See McKenzie, *supra* note 61 at 446.

74 See Gray, *supra* note 72 at 82–83; *ICM Agriculture Pty Ltd v Commonwealth*, [2009] HCA 51, 261 ALR 653 at para 59 [*ICM*].

75 See *ibid* at para 62.

76 See *ibid* at para 61 (a 1966 amendment to the *Water Act 1912*, *supra* note 10 had already introduced restrictions on the rate of extraction from "restricted sub-surface water areas", s 117A(3)(a)).

Rather than a "first in time, first in right" system where priority of use went to the oldest water licensees, the amendment to the *Water Act* 1912 (NSW) allowed for priority diversion of volumetric entitlements in specified circumstances,[77] and during periods of water shortage it further authorized the restriction or suspension of rights for the taking of water in accordance with a specified order of priority between different users.[78] While designed for use in circumstances of water shortage, this provision also began to inform water allocation priorities, such that higher priority uses were favored in circumstances when NSW was considering several proposed water uses that might impinge on each other.[79]

While the *Water Act* 1912 (NSW) overcame some of the problems associated with the common law regime, a number of problems remained. Most significantly, by the 1970s, the water in many systems was over-allocated with consequential effects on both the security of water entitlements and the health of the riverine ecosystem.[80] Concerned with avoiding resource exhaustion, in 1986 NSW introduced further amendments to make the transfer of water allocations possible with approval[81] and to include environmental considerations into the allocation and management of water.

In addition to efforts to manage water within NSW, water users and the State recognized the need to cooperatively manage the rivers flowing through the MDB. As with NSW based water reform, the Federation Drought served as the catalyst to bring NSW, Victoria, South Australia, and Commonwealth governments together to sign the 1914 River Murray Water Agreement (*the Agreement*). Focused specifically on water supply and navigation along the River Murray, the *Agreement* provided for the construction of two major dams, water-sharing arrangements between the states of NSW and Victoria, and the provision of a specified minimum quantity of water to the downstream state of South Australia. With the increase in surface water extractions throughout the MDB states causing water quality and environmental issues, in 1983, the role of the River Murray Commission—the body tasked with overseeing the *Agreement*—was expanded to include water quality and environmental issues. In 1987 the Commonwealth, NSW, Victoria, and South Australia signed the first *Murray-Darling Basin Agreement.* This was followed by the more comprehensive agreement in 1992, providing the newly established Murray-Darling Basin Commission with an expanded role encompassing land, water and environmental management within the MDB.

However, these reforms, at both the state level and across the MDB, did not sufficiently address the declining health of the NSW's rivers, groundwater, floodplains, and estuaries, or the associated problems of diminished water quality, loss of species, wetland decline, and habitat loss. Significantly, the reforms also did not provide responsive adaptive management measures necessary to balance the demands of consumptive users with those of water dependent ecosystems in the face of over-allocation and scarcity.

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77 *Water Act 1912*, *supra* note 10, s 20X.

78 *Water Act 1912*, *supra* note 10, s 22B(4). Rights relating to domestic purposes and town and village water supply were the last to be restricted or suspended.

79 See Dragun & Gleeson, *supra* note 66 at 657.

80 See Gardner, Bartlett & Gray, *supra* note 59 at 37.

81 See *Water Amendment Act 1986 No. 196* (NSW), Schedule 9. Under the *Private Irrigation Districts Act 1972* (NSW), permanent water transfers without the transfer of land became permissible within private irrigation districts. See Dragun & Gleeson, *supra* note 66 at 659–60.

3.3. Law Reform

With similar water management issues across the country, most Australian jurisdictions have undertaken major water law reform in the last several years.[82] Two major agreements entered into by the Council of Australian Governments (CoAG)[83] have driven the national reform process: the 1994 *Water Reform Framework Agreement* (the 1994 *CoAG Agreement*), and the 2004 *National Water Initiative* (the *NWI*).[84] Building on the 1994 *CoAG Agreement,* the *NWI* recognizes the "national imperative" to ensure water is used efficiently and sustainably and to maintain the health of surface and groundwater systems.[85] The *NWI* explicitly recognizes the impacts of climate change on future water allocations, and the need to build adaptive measures into the management framework.[86]

To ensure the efficient use of water, the 1994 *CoAG Agreement* and the *NWI* endorse the creation of secure, exclusive, and enforceable water entitlements, tradable in a national market.[87] To ensure the maintenance of healthy water systems, the 1994 *CoAG Agreement* requires state government parties to determine the environmental requirements necessary to maintain the health and viability of river systems and groundwater basins, having regard to both inter-temporal and inter-spatial water needs,[88] and to undertake appropriate assessments to establish that the environmental requirements of the river systems are adequately met before harvesting water resources for any significant future irrigation activity or dam construction.[89] In cases where river systems are already over-allocated, or deemed to be stressed, arrangements are to be instituted to provide a better balance in water resource use including appropriate allocations to the environment in order to enhance and/or restore the health of river systems.[90] The *NWI* adds tools necessary for adaptive management, with the CoAG states agreeing to the creation of comprehensive statutory water-planning frameworks, the allocation of water to the environment to protect both water sources and dependent ecosystems, and, perhaps most

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82 For a discussion of the various traditional obstacles faced by statutory water reforms throughout Australia, see Gardner, Bartlett & Gray, *supra* note 59 at 216–217.

83 The CoAG is Australia's peak intergovernmental forum, made up of the Prime Minister, State and Territory Premiers and Chief Ministers, and the President of the Australian Local Government Association. See Council of Australian Governments, "About COAG" online: <www.coag.gov.au/about-coag>.

84 See Australia, Environment Australia, The Council of Australian Governments' Water Reform Framework (Canberra: Marine and Water Division, 1994) [Australia, 1994 CoAG Agreement]; Australia, Council of Australian Governments, Intergovernmental Agreement on a National Water Initiative (Canberra: National Water Commission, 2004) [Australia, NWI]. The Commonwealth Government "encouraged" the States to implement the 1994 CoAG Agreement by making payments under the National Competition Policy contingent on the satisfactory implementation of the water reforms.

85 *Ibid*, preamble, cl 5.

86 *Ibid*, cl 25(iv), 82(iii)(c).

87 *Ibid*, cl 23, 31. As the pre-requisite to establishing a water market, State government parties agreed in the 1994 CoAG Agreement to separate water entitlements from land; Australia, 1994 CoAG Agreement, *supra* note 84, cl 4(a).

88 Australia, 1994 CoAG Agreement, *supra* note 84, cl 4(d).

89 *Ibid*, cl 4(f).

90 *Ibid*, cl 4(d).

notably, the adoption of share-based water entitlements to allow water managers the flexibility to adapt to fluctuating flows.[91]

To give effect to the CoAG agreements, NSW enacted the *Water Management Act* 2000 (NSW), amending it in 2004 to align with the *NWI*.[92] Specifically recognizing that the principles of adaptive management should be applied,[93] the *Act* mandates the creation of statutory water management plans pursuant to which licensing and management decisions are made. The *Act* also requires consideration of environmental flows, with rules embedded within water management plans to ensure water dependent ecosystems are protected and restored, and water is specifically allocated to the environment.[94] In keeping with the CoAG reform agenda, the *Act* also provides for the creation of perpetual entitlements to water and the development of water markets while ensuring the capacity for adaptive management in a manner responsive to the availability of water and changing climatic conditions through share-based rather than volumetric water entitlements.[95] Even the exercise of statutorily defined domestic and stock rights,[96] harvestable rights,[97] and native title rights[98], which sit outside the water access licensing regime, are subject to defined limits.[99] Finally, with priorities between categories of licensed users specified in the *Act*,[100] and the capacity to suspend water management plans and revert to statutory rules of prioritized distribution during times of severe water shortage, the *Water Management Act* 2000 (NSW) appears to equip water managers in NSW with the capacity to apply the principles of adaptive management.

Despite these legislative reforms at the state level, in the face of the continuing pressure posed by severe drought and climate change, the Commonwealth government and the state governments within the MDB increasingly recognized that a truly inter-jurisdictional approach was required to manage the MDB.[101] As such, the four Basin States and the Australian Capital Territory took the exceptional step of referring legislative power to the Commonwealth government to allow for the passage of the *Water Act* 2007 (Cth).[102] With stated objects that include ensuring environmentally sustainable levels of extraction and protecting, restoring, and

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91 Australia, *NWI*, *supra* note 84, cl 25(ii).

92 See the *Water Management Amendment Act 2004* (Cth). The *Water Act 1912*, *supra* note 10, continues to apply for areas that are not covered by water sharing plans, which is less than 5% of the water in the State. See Australia, National Water Commission, *Water Planning Report Card 2013* (Canberra: National Water Commission, 2013) at 7 [Australia, *Report Card*].

93 *WMA 2000*, *supra* note 10 at s 5(2)(h) (the principle in full states: "principles of adaptive management should be applied, which should be responsive to monitoring and improvements in understanding of ecological water requirements").

94 See discussion on environmental water at section 3.3.2.1 below.

95 See discussion on flexibility in water entitlements at section 3.3.3 below.

96 *WMA 2000*, *supra* note 10, s 52.

97 *Ibid*, ss 53–54.

98 *Ibid*, s 55.

99 *Ibid*, ss 336B, 53(2), 55(3).

100 *Ibid*, ss 57–58.

101 Gardner, "Overview", *supra* note 49 at 265.

102 The implementation of the MDB water reforms was fully agreed to by all Basin States on February 2014, with the signing of the Australia, Council of Australian Governments, *Intergovernmental Agreement on*

providing for the ecological values and ecosystem services of the MDB,[103] the *Water Act* 2007 (Cth) provides additional legislative tools to allow for the integrated and adaptive management of water in the MDB—most notably through the Basin Plan. The Plan is intended to limit water use to environmentally sustainable levels across the MDB by determining long-term average sustainable diversion limits (SDLs) for the basin as a whole, as well as the surface water and groundwater resources within it. While not intended to exclude or limit the concurrent operation of any law of the NSW,[104] the *Water Act* 2007 (Cth) and the Basin Plan[105] provide a further layer of adaptive tools to integrate management across hydrological rather than jurisdictional boundaries and protect environmental flows.

3.3.1. Integration

The *Water Management Act* 2000 (NSW) and the *Water Act* 2007 (Cth) together provide for the spatial and hydrological integration of water management and allocation. The key tools for achieving the integrated management of these resources in each piece of legislation are mandatory water management plans, which set resource-level limits on water available for consumptive purposes, integrate environmental considerations, and integrate changing water availability into decision making.

Integration under the Water Management Act 2000 (NSW)

The *Water Management Act* 2000 (NSW) provides for the integrated management of NSW's water resources through statutory management plans that must be developed for all water resources within the state.[106] With the *Act* covering water in rivers, lakes, and estuaries, as well as the water that occurs on or below the surface of the ground including "overland flow water",[107] the planning system is comprehensive and hydrologically diverse.

The primary planning instrument under the *Act* is water-sharing plans (WSPs).[108] As the name suggests, the role of WSPs, therefore, is to set the rules for the sharing of water from a particular water source between all water users, including the environment. Guided by the

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Implementing Water Reform in the Murray-Darling Basin (June 2013, signed February 2014) [Australia, *Agreement on Implementing*].

103 *Supra* note 11, s 3(d). This object operates without limiting the Acts stated objects of: giving effect to relevant international agreements that are relevant to the Basin (*ibid,* s 3(b)); and, in giving effect to those agreements, promoting the use and management of the Basin water resources in a way that optimized economic, social and environmental outcomes (*ibid s* 3(c)).

104 *Ibid*, s 250B.

105 *Basin Plan*, *supra* note 18.

106 *WMA 2000*, *supra* note 10, ss 15–49. Division 8 of Part 3 specifies the procedures for making management plans which include provisions for public exhibition of the draft management plan and provide for "any person" to make a written submission (*ibid*, s 38).

107 "Overland flow water" means water that is flowing over the ground—even if by artificial means—or lying on the ground as the result of: rain or other precipitation; rising to the surface from underground; or, any other process or action described in the regulations (*ibid,* s 4A).

108 In addition to water sharing, water management plans may include programs relating to any aspect of water management including: water source protection, drainage management, and floodplain management (*ibid*, s 15(1)).

water management principles specified in the *Act*,[109] individual WSPs set annual limits on water extraction, establish environmental water rules and create rules relating to the extraction of water under, and the trade in, water licences.[110] Water-sharing plans also make provision for the exercise of native title rights to take and use water recognized under the *Native Title Act* 1993 (Cth)—these rights may be exercised without the need for a licence.[111] WSPs also provide for water use for cultural purposes by Aboriginal communities and persons authorized to use water pursuant to Aboriginal cultural water access licences.[112] Beyond the sharing of water, WSPs may contain provisions to control development or activities directed at environmental protection,[113] and specifically contemplate the protection of spiritual, social, and customary values of Aboriginal communities.[114] Recognizing any limits on the availability of water and the effect of climatic variability on the availability of water,[115] individual WSPs also establish rules for granting new access licences, managing water determinations in relation to the water source in question and setting priorities of supply, which determine how water is shared amongst different types of licenses when there is a reduction in water availability. A WSP may also specify mandatory conditions to be imposed on water licences, such as conditions providing for variation from time to time of the share and extraction components of a water access licence.[116] Once in place, WSPs should provide for the environmental needs of the rivers, groundwater systems, and dependent ecosystems and to provide a level of security of supply to licensed water users through clearly defined entitlements to a share of the water.[117]

WSPs typically cover regulated rivers, regulated rivers, or major aquifer systems.[118] However, where there is an interconnection between the surface water and groundwater some plans cover both surface water and groundwater sources. Since 2007, WSPs for unregulated rivers and groundwater systems have been developed on a "macro" or broader scale river catchment or aquifer system approach.[119]

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109 *Ibid*, s 5.

110 *Ibid*, s 20(1).

111 *Ibid*, s 55.

112 *Ibid*, s 20 and *Water Management (General) Regulation 2004* (NSW), Schedule 3. Aboriginal businesses may also obtain Aboriginal Community Development Water Access Licenses, but only in coastal areas and in some groundwater systems with Water Sharing Plans. However, these licenses are only available for groundwater or unregulated rivers during high flows.

113 See *WMA 2000*, *supra* note 10, ss 32–34.

114 See *ibid*, s 5(2)(f). See also, New South Wales, Department of Primary Industries, *Our Water Our Country: An information manual for Aboriginal people and communities about the water reform process* (Sydney: NSW Office of Water, 2012) at ch 1-1.

115 Most WSPs use long-term climate data for their development to provide for climate viability. The provisions relating to daily water access and the adjustments to available water determinations also indirectly account for climatic variability; Australia, *Report Card*, *supra* note 92 at 8.

116 See *WMA* 2000, *supra* note 10 at s 20(2) (section 21 provides a number of additional matters that may be included in a WSP).

117 New South Wales, Department of Natural Resources, *Water Management and Reform in New South Wales*, by David Harriss (Sydney: Water Management, 2006).

118 NWC, *Australian Water Markets Report*, *supra* note 47 at ch 4.4.

119 See New South Wales, Department of Primary Industries, "Water Sharing Plans", online: <www.water.nsw.gov.au/water-management/water-sharing>. For a discussion of the macro water sharing planning

In designing WSPs, due regard must be had to the socio-economic impacts of the proposals considered for inclusion in a plan.[120] WSPs have a duration of ten years, subject to Ministerial review every five years to ensure that the plan's provisions remain adequate to ensure the water management principles are being appropriately implemented.[121] In keeping with an adaptive management approach, water sharing planning follows a cyclic loop—planning, implementation with monitoring,[122] and evaluation before the next planning stage.

The *Water Management Act* 2000 (NSW) is being progressively implemented, with the first WSPs developed in 2004. A time and resource intensive process, the preparation of WSPs is still underway in NSW. A total of 67 WSPs are in operation, with nine draft plans currently being exhibited and an additional four plans still under development.[123] As WSPs are only valid for 10 years, the first WSPs developed in 2004 (31 in total) are already under review.[124]

Integration under the Water Act 2007 (Cth)

The *Water Act* 2007 (Cth) introduces a further level of integration through the Basin Plan, which lies at the heart of the legislation and provides for interjurisdictional water management across the hydrological rather than jurisdictional boundaries of the MDB. The Basin Plan will largely achieve this by setting long-term average limits, known as sustainable diversion limits (SDLs),[125] for the MDB as a whole and the catchments and groundwater systems within it.

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approach, see New South Wales, Office of Water, Macro Water Sharing Plans – The Approach for Unregulated Rivers: A Report to Assist Community Consultation, 2nd ed (Sydney: NSW Office of Water, 2011), online: <www.water.nsw.gov.au/__data/assets/pdf_file/0008/548153/macro_unreg_manual_web.pdf>

120 See *WMA 2000*, *supra* note 10 at s 18.

121 See *ibid* at s 43.

122 For information about the integrated monitoring programs in place in NSW, see New South Wales, Department of Primary Industries, "Monitoring", online: <www.water.nsw.gov.au/water-management/monitoring>.

123 For WSPs under development, see New South Wales, Department of Primary Industries, online: <www.water.nsw.gov.au/water-management/water-sharing/>.

124 For review and replacement of WSPs, see New South Wales, Department of Primary Industries, "Water Sharing Plans Under Development", online: <www.water.nsw.gov.au/water-management/water-sharing/plans-review>. The Minister is empowered, on the recommendation of the Natural Resources Commission, to extend a water sharing plan for another 10 years or replace it (*WMA 2000*, *supra* note 10, s 43A).

125 *Basin Plan, supra* note 18 at s 5.05. It states that the objectives and outcomes in relation to long-term SDLs are as follows:

> 1. The objective in relation to long-term average sustainable diversion limits is to establish environmentally sustainable limits on the quantities of surface water and groundwater that can be taken for consumptive use from Basin water resources, having regard to social and economic impacts, and in doing so:
>   (a) Inform environmental water recovery measures, including water purchasing and infrastructure that improves water use efficiency; and
>   (b) Provide greater certainty for all water users, including in times of drought and low water availability; and
>   (c) Provide time for water access entitlement holders and communities to transition and adjust to long-term average sustainable diversion limits.

These limits, in turn, establish an "environmentally sustainable level of take" (ESLT), capping the amount of water that can be taken for industry, agriculture, and other consumptive uses. The Basin Plan also requires the preparation of an Environmental Watering Strategy in order to integrate environmental water priorities across the MDB and coordinate the development of mandatory environmental watering plans for surface waters by Basin states.[126] As water quality and salinity issues are also important within the MDB, the Basin Plan requires the preparation of a Water Quality and Salinity Management Plan to deliver a cohesive approach to the management of these issues.[127] The Basin Plan takes an explicit adaptive management approach,[128] with an extensive monitoring and evaluation program informing annual reports and the five and ten year review of the Basin Plan. Importantly, the Plan also provides a process for adjustment of the SDLs.[129]

The catchment and aquifer SDLs set by the Basin Plan, and mechanisms through which inter-related water management take place, are in turn delivered through mandatory state-based water resource plans.[130] The Basin Plan therefore requires individual water resource plans to do a number of things, including: setting rules for water sharing between consumptive users based on the SDL, establishing environmental watering rules consistent with the *Environmental Watering Strategy*, providing for water quality management in accordance with the *Water Quality and Salinity Management Plan*, setting rules for water trading, and identifying water dependent Indigenous values and uses through consultation.[131]

Individual water resource plans are also charged with assessing the risks to the water resources covered by the Basin Plan and taking into account potential and emerging threats to

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2. The outcomes in relation to the establishment of long-term average sustainable diversion limits are:
   (a) The restoration and protection of water-dependent ecosystems and ecosystem functions in the Murray-Darling Basin; and
   (b) Well-informed water recovery measures, including water purchasing and infrastructure, enable a transition to long-term average sustainable diversion limits; and
   (c) Greater certainty of access to Basin water resources; and
   (d) Water access entitlement holders and communities of the Murray-Darling Basin are better adapted to reduced quantities of available water.

126 See *ibid* s 8.01–8.62.

127 See *ibid*, s 9.01–9.19.

128 One of the Basin Plan's main objectives is "to establish a sustainable and long-term adaptive management framework for the Basin water resources" (*Basin Plan, supra* note 18 s 5.02(1)(b)). Adaptive management is defined to include: setting clear objectives; linking knowledge (including local knowledge), management, evaluation and feedback over a period of time; identifying and testing uncertainties; using management as a tool to learn about the relevant system and change its management; improving knowledge; and, having regard to the social, economic and technical aspects of management (*Basin Plan, supra* note 18 s 1.07).

129 *Basin Plan*, *supra* note 18, s 7.01–7.27. See especially s 7.09.

130 The water resource plan areas established by the Chapter 3 of the *Basin Plan* will, for the most part, correspond to existing water management areas established under the state-based water legislation (*ibid,* s 10.07). For a map of the water resource areas established under the Basin Plan, see Australia, Bureau of Meteorology, "Murray–Darling Basin Physical information", online: <www.bom.gov.au/water/nwa/2013/mdb/contextual/physicalinformation.shtml>.

131 For details of water resource plan requirements, see *Basin Plan, supra* note 18, s 10.01–10.55.

water resources. Of particular note from an adaptive management perspective, water resource plans must also describe how water resources in the plan area will be managed during extreme dry periods, a water quality event that renders water acutely toxic or unusable for established local uses and values, and any event that has in the past 50 years resulted in the suspension of the plan.[132] The plan must provide that if new scientific information suggests a change in the likelihood of these types of events occurring (e.g., due to climate change) consideration must be given as to whether the water resources should be managed differently.[133]

In keeping with an adaptive management approach, the Basin Plan is being implemented incrementally. SDLs will be determined in 2016, with Basin states required to have accredited water resource plans in place by 2019.[134] In NSW, the WSPs prepared under the *Water Management Act* 2000 (NSW) will form an important part of the water resource plans, with the review processes occurring at the state level to improve consistency and compliance with both NSW and Commonwealth legislation.[135]

While evaluation and adjustment will continue in the years that follow, by 2019 the Basin Plan and the associated state-based water resource plans should work together to provide a consistent and cohesive Basin-wide approach to the management of water resources across the MDB. Further, while individual plans are directed at the particular surface water catchment and groundwater resources within the plan area, plans are required to take into account the water resources of adjacent water resource plan areas and any other water resources that have a significant hydrologic connection to the resources of the plan area.[136] This ensures further hydrological and spatial integration of water resources within the MDB.

While undoubtedly adding complexity, the *Water Act* 2007(Cth) and the Basin Plan seek to achieve what the sub-national jurisdiction of NSW could not achieve alone, allowing for the integration of SDLs and water planning throughout the MDB.

3.3.2. Environmental Flows

Through the 1994 *CoAG Agreement*, State governments agreed to "give priority to formally determining … allocations for the environment as a legitimate user.[137] This commitment is renewed in the *NWI*,[138] and is met through the "environmental water" provisions in the *Water Management Act* 2000 (NSW) and the SDL limits and environmental watering plans established for the MDB under the *Water Act* 2007 (Cth).[139]

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132 See *ibid*, s 10.51.

133 See *ibid*, s 10.51(3).

134 *Ibid*, s 10.10–10.14.

135 See New South Wales, Department of Primary Industries, "Water Resource Plans", online: <www.water.nsw.gov.au/water-management/water-resource-plans>.

136 *Basin Plan, supra* note 18, s 10.05.

137 Australia, 1994 CoAG Agreement, *supra* note 84, cl 4(b).

138 For a detailed discussion of the national water policy principles relating to environmental water allocations, see Alex Gardner, "Environmental Water Allocations in Australia" (2006) Environment & Planning L J 208 at 212–214 [Gardner, "Water Allocations"].

139 *Water Act 2007* (Cth), *supra* note 11, ss 23 and 28.

Provisions for Environmental Water in the Water Management Act 2000 (NSW)

The *Water Management Act* 2000 (NSW) provides for two kinds of environmental water. "Planned environmental water" is "water that is committed by management plans for fundamental ecosystem health or other specified environmental purposes, either generally or at specified times or in specified circumstances, and that cannot to the extent committed be used for any other purpose."[140] As noted above, all WSPs made under the *Water Management Act* 2000 (NSW) must contain environmental water rules, and these rules must make provision for the identification, establishment and maintenance of this planned environmental water.[141] Amendments to the *Act* removed an apparent "tentative duty" to establish rules to set aside planned environmental water prior to determining the allocation of water for consumptive purposes.[142] However, it remains a statutory requirement for WSPs to commit planned environmental water, which necessitates consideration of the quantities needed to protect water sources and their dependent ecosystems when establishing allocation rules for consumptive purposes in WSPs.[143] It is also worth noting that the *Water Management Act* 2000 (NSW) makes provision for the issue of Aboriginal cultural water access licences to provide water for cultural purposes.[144] Given their purpose, these water access licences may "mirror environmental needs such as filling wetlands, increasing seasonal flows or improving instream habitat."[145]

The *Water Management Act* 2000 (NSW) also makes provision for "licensed environmental water," meaning water committed to the environment pursuant to an adaptive environmental water condition attaching to a water license, or water taken or permitted to be taken under a licence of an environmental subcategory or prescribed class.[146] The terms of the adaptive water condition attaching to a licence are to further the objectives of the relevant water-sharing plan,[147] allowing for the dedication of existing water shares or water acquired through systems improvements to the environment.[148] Water purchased through State sponsored programs,

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140 *WMA 2000*, *supra* note 10, s 8(1)(a) (this section of the Act originally provided for "environmental health water" meaning "water that is committed for fundamental ecosystem health *at all times*" [emphasis added]).

141 *Ibid*, s 8(2).

142 See Gardner, "Water Allocations", *supra* note 138 at 217–218. The validity of a management plan which failed to do so was unsuccessfully challenge in *Nature Conservation Council of New South Wales Inc v Minister Administering the Water Management Act 2000* [2005] NSWCA 9. Gardner argues that here is a greater potential, based on the reasoning in *Project Blue Sky*, that a court could enforce the duty to make adequate environmental water allocations prospectively (*supra* note 138 at 218–219).

143 Tim Bonyhady, "Putting the Environment First?" (2012) 29 Environmental & Planning L J 316 at 320.

144 *Water Management (General) Regulation 2011* (NSW), s 10.

145 See New South Wales, Office of Water, *Our Water Our Country* (Sydney: NSWDPI, 2012) at 3–8 ,online <www.water.nsw.gov.au/__data/assets/pdf_file/0004/547303/plans_aboriginal_communities_water_sharing_our_water_our_country.pdf>. These type of access licenses are only available to Aboriginal applicants, must be used for clearly defined cultural purpose endorsed by the relevant Traditional Owners and Local Aboriginal Land Council, are time limited to its cultural purpose and cannot be traded or used to make money and are limited to 10 megalitres.

146 *WMA* 2000, *supra* note 10, s 8(1)(b).

147 *Ibid*, s 8E(2), 8E(2)(3).

148 *Ibid*, s 8E(2).

such as the Living Murray Initiative—focused on improving the health of specific icon sites—is held as licensed environmental water.[149]

In addition to licenced environmental water, the *Water Management Act* 2000 (NSW) allows for an individual or water manager to purchase and hold a water licence for an environmental purpose.[150] The Australian Government has purchased a significant number of water licences in NSW that retain their original licence characteristics but are instead used for environmental purposes.[151]

Provision for Environmentally Sustainable Levels of Extraction, Environmental Water and Environmental Watering Plans in the Water Act 2007 (Cth)

A central object of the *Water Act* 2007 (Cth) is to ensure the return to environmentally sustainable levels of extraction for over-allocated or overused water resources and to "protect, restore and provide for the ecological values and ecosystem services of the Murray-Darling Basin".[152] Key to achieving this objective is to set long-term average SDLs for the MDB water resources as a whole as well as for particular water resource plan area.

This is a "scientifically and politically complex"[153] task. Following the release of the first proposed Basin-wide SLD, a storm of controversy ensued as a result of its focus on the environmental needs of the Basin.[154] Following several legal opinions on the interpretation of the *Water Act* 2007 (Cth) and replacement of the Chairman of the MDB Authority, the draft Basin Plan released thereafter sought to "balance" environmental, economic and social needs—significantly reducing the amount of water set aside for the environment.

The resulting Basin Plan, which took effect in 2012, has in turn been criticized for prioritizing economic and social considerations above the issue of sustainable water extraction.[155] Nevertheless, under the Basin Plan 2,750 GL of water needs to be recovered from diversions across the MDB by 2019. In addition, the SDLs set by the Basin Plan for some water resources in NSW are lower than the extraction limits specified in some WSPs.[156] As a result, the Basin Plan will influence the amount of water left for the environment in water resources within NSW and the MDB.

The *Water Act* 2007 (Cth) also provides that water may be set aside for the environment under the Basin Plan or a state water resource plan. As with NSW's legislation, this type of

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149 See New South Wales, Department of Primary Industries, "Environmental Rules", online: <www.water.nsw.gov.au/water-management/water-sharing/environmental-rules>.

150 See *ibid*.

151 See NWC, *Australian Water Markets Report*, *supra* note 47 at ch 4.4.

152 *Water Act 2007* (Cth), *supra* note 11, s 3(d).

153 Gardner, "Overview", *supra* note 49 at 266.

154 Bonyhady, *supra* note 143 at 321–325.

155 *Ibid* at 327.

156 See New South Wales, Department of Primary Industries, "The Basin Plan for the Murray-Darling", online: <www.water.nsw.gov.au/water-management/law-and-policy/national-reforms/murray-darling-basin-plan>.

water is referred to as "planned environmental water."[157] The *Water Act* 2007 (Cth) also makes provision for "held environmental water"—meaning water available under a water access right for the purpose of achieving environmental outcomes specified in the water access right.[158] The Commonwealth Environmental Water Holder is the largest holder of environmental water in the MDB.[159] As of May 31, 2015 it has holdings totaling 2,289,433 megalitres (ML) of registered entitlements with a long term average annual yield of 1,575,557 ML.[160] The Commonwealth acquired this water through a combination of government purchases of water access rights and investment in efficient water infrastructure.[161]

The *Water Act* 2007 (Cth) recognizes that although the Basin Plan's SDLs, together with planned and held environmental water, will return more water to catchments and aquifers throughout the MDB, this in and of itself will not ensure optimal environmental outcomes are achieved. To this end, the *Water Act* 2007 (Cth) also mandates the creation of an Environmental Watering Plan to maximize environmental outcomes with available water.[162] Described by the Murray-Darling Basin Authority as "a plan within a plan,"[163] the Environmental Watering Plan presents a significant opportunity to implement both flexible and adaptive management techniques to maintain environmental flow and maximize the benefit of available water for water dependent ecosystems. With decisions relating to when and where specific sites are watered determined at the local and regional level through resource specific watering plans, the Environmental Watering Plan emphasizes a collaborative approach to water management as well as the importance of "localism" to find local solutions for local problems.[164] To this

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157 *Water Act 2007* (Cth), *supra* note 11, s 6.

158 *Ibid*, s 4.

159 See Australia, Department of Environment and Energy, *Murray-Darling Basin Environmental Water Holders Report 2013*, (2013) at 4 online: <www.environment.gov.au/water/cewo/publications/murray-darling-basin-environmental-water-holders-report-2013>. For a list of the Commonwealth's environmental water holdings, see Australia, Department of the Environment and Energy, "Water Holdings", online: <www.environment.gov.au/water/cewo/about/water-holdings>.

160 See Australia, Department of the Environment and Energy, "About Commonwealth Environmental Water", online: <www.environment.gov.au/water/cewo/about-commonwealth-environmental-water>.

161 A large amount of this water has been acquired through the Living Murray program, which commenced in 2002 to address the declining health of the River Murray system and dependent ecosystems. See Australia, Department of the Environment and Energy, "Ten years of The Living Murray program - restoring the health of the Murray River", online: <www.environment.gov.au/water/wetlands/publications/wetlands-australia/national-wetlands-update-february-2013-1>. Buybacks were also undertaken through the Restoring the Balance Program, which is part of the Commonwealth Government's Sustainable Rural Water Use and Infrastructure Program that invests in irrigation infrastructure projects, water purchase, and supply measures to acquire environmental water throughout Australia but particularly in the MDB. See Australia, Department of the Environment and Energy, "Rural Water", online: <webarchive.nla.gov.au/gov/20130904113630/http://www.environment.gov.au/water/policy-programs/rural/index.html>.

162 See *Water Act 2007* (Cth), *supra* note 11, s 28(1); *Basin Plan, supra* note 18, Schedule 7, ss 8.01–8.62.

163 See Australia, Murray-Darling Basin Authority, *Environmental Watering Plan*, (30 January, 2013) ch 1[MDBA, Watering Plan].

164 See Australia, National Water Commission, *Murray-Darling Basin Plan Implementation: Initial Report*, (Canberra, National Water Commission, 2013) at 23 and 24 online: <webarchive.nla.gov.au/gov/20160615063934/http://www.nwc.gov.au/publications/topic/audit-reports/murraydarling-basin-plan-implementation-initial-report>.

end, the Environmental Watering Plan requires the preparation of State-based Environmental Watering Plans, a Basin-wide Environmental Watering Strategy and Basin-wide and State based annual watering priorities.

The first Basin-wide Environmental Watering Strategy was put in place in November 2014.[165] Key strategies outlined in the Strategy include management of all water to benefit the environment, where possible, in harmony with biological cues (including responses to flow) to restore elements of a more natural flow regime, and coordination to achieve the best outcomes and target multiple sites with deliveries of water (in and between rivers).[166] This may include, for example, the coordinated release of environmental water with irrigation water to create a controlled flood event or managing river flows to water several different environmental sites.[167] The planning and coordinating of such complex events—both from a hydrological and management perspective—necessarily requires cooperating and flexibility to accommodate existing water conditions. In the early stages, it will take time to implement, and evaluate the extent to which this Strategy and the Plan upon which it depends are able to meet its environmental objectives.

3.3.3. Flexibility in Water Entitlements: Regulation and Compensation?

Flexibility in Regulation

The flexibility to alter water users' entitlements in response to changing water availability is an essential feature for adaptive management. Yet, to increase productivity and efficiency of water use, the *NWI* endorses the creation of a "nationally-compatible market" backed by secure, exclusive, enforceable, and tradable water access entitlements.[168] The *NWI* further provides that except during water emergencies the state should only cancel such water access entitlements where the responsibilities or obligations of the entitlement holder have clearly been breached and further that such entitlements should only be varied where mutually agreed between the government and the entitlement holder.[169] This approach appears to leave little room for adaptive measures.

However, the *NWI* resolves the "tension between the existence of property rights in water and the flexibility required for adaptive management"[170] by contemplating the creation of secure rights in a *share* of the consumptive pool available in a specific water resource as determined by a water plan[171] rather than a secure right to a specified volumetric allocation of water. In this way, the volumetric allocation associated with the right to a share can fluctuate depending on annual flow without interfering with the right.

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165 See Murray-Darling Basin Authority, *Basin-Wide Environmental Watering Strategy*, (Australia: MDBA, 2014) [MDBA, *Strategy*].

166 See *ibid* at ix.

167 See MDBA, *Watering Plan*, *supra* note 163.

168 Australia, NWI, *supra* note 84, cl 23, 31.

169 *Ibid*, cl 32.

170 See McKenzie, *supra* note 61 at 444. For a discussion of the effects of strengthened property rights on adaptive capacity, see also Pagan & Crase, *supra* note 28 at 82–85.

171 Australia, NWI, *supra* note 84, cl 28.

The *Water Management Act* 2000 (NSW) implements this approach providing that a "water access licence" entitles its holder:

> (a) to specified shares in the available water within a specified water management area or from a specified water source (the "share component"), and
>
> (b) to take water:
>
> (i) at specified times, at specified rates or in specified circumstances, or in any combination of these, and
>
> (ii) in specified areas or from specified locations,
>
> (the "extraction component").[172]

A water access licence holder, therefore, is entitled to a specified proportion of a shared resource. In keeping with the *NWI*, while potentially perpetual, this does not create what commentators have called a "pure perpetual water right"[173] —a right to take a specified volume of water in perpetuity. To do this would be inconsistent with the principle of adaptive management specified as a guiding principle in the *Water Management Act* 2000 (NSW). Rather, what is created is a right to a specified share of the available water.

In order to determine the amount of water available at any given time, the responsible Minister is authorized to make determinations as to water availability for one or more categories of access licences in relation to one or more specified water management areas or water sources. Priorities as between the various categories of licences are assigned by the WSP or, otherwise, by the *Water Management Act* 2000 (NSW),[174] such that if water allocations must be diminished because of water shortage, the allocation to the higher priority access licence will be diminished at a lesser rate than a lower priority access licence.[175] Nevertheless, the water allocation available to water access licences holders can be adjusted to accommodate, and adapt, to changes in water flow. The ability to trade water is also an important tool, as this allows water use patterns to adapt to shifting availability and water to move toward higher value uses.

The *Water Management Act 2000* (NSW) also contains a grab bag of other provisions that allow for adaptive management. For example, the Minister, with the concurrence of the Minister for Climate Change and the Environment, has the power to amend a WSP at any time if, amongst other reasons, she is satisfied that it is in the public interest to do so.[176] In addition, the Minister has the power to suspend a WSP if she is satisfied that there is a severe water shortage in relation to a particular water management area or a water source.[177] When this occurs, the priorities assigned to various categories of licences by the *Act*[178] are varied to

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172 *WMA 2000*, *supra* note 10, s 56(1) (the share component may be expressed as a specified maximum volume over a specified period, a specified proportion of the available water, a specified proportion of storage capacity in a dam or work or a specified number of units (s 56(2)).

173 See Pagan & Crase, *supra* note 28 at 85. See also McKenzie, *supra* note 61 at 454.

174 *WMA 2000*, *supra* note 10, ss 57–58.

175 *Ibid*, s 58(2).

176 *Ibid*, s 45.

177 *Ibid*, s 49A.

178 *Ibid*, s 58.

allow first priority to basic domestic purposes and second priority to the environment before the taking of water for other purposes.[179] Finally, in addition to any condition that the *Act* or that a WSP might impose, the Minister is given the discretion to impose conditions, including conditions relating to the protection of the environment, on water access licences at any time provided the condition is not inconsistent with a condition imposed when the licence was issued.[180] When exercising these and other functions under the *Water Management Act* 2000 (NSW), the Minister must "take all reasonable steps to give effect to the provisions of any management plan and, in particular, to ensure that any environmental water rules established by the plan are observed."[181]

Nothing in the *Water Act* 2007 (Cth) or the Basin Plan directly affects water entitlements or allows for their compulsory acquisition.[182] Nevertheless, the SDLs set by the Basin Plan, which are in turn incorporated into the state-based water resource plans will reduce the amount of water available for consumptive extraction. The Commonwealth has committed, however, to "bridge the gap" between the baseline diversion limits and the SDLs in the Basin Plan by investing in efficient water infrastructure and purchasing water access rights from willing sellers.[183]

Flexibility in Water Entitlements: Compensation?

To accommodate adaptive management, the NWI also specifies when entitlement holders are owed compensation for changes in water allocations. First, as the holder of a water access entitlement is only entitled to a share of the available water, the cost, and therefore the risk, of any reduction or less reliable water allocation resulting from adaptive measures responding to seasonal or long- term changes in climate is born by the water access entitlement holder.[184] No compensation is owed to the entitlement holder in these circumstances.[185] Initially, the *NWI* also assigned to the holders of water access entitlements the risk of any reduction or less reliable water allocation "arising as a result of bona fide improvements in the knowledge of the water systems' capacity to sustain particular extraction levels." After 2014, in new or renewed plans, this risk is shared between water entitlement holders, the state government and

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179 *Ibid*, s 60(3).

180 *Ibid*, s 66.

181 *Ibid*, s 48.

182 *Water Act 2007* (Cth), *supra* note 11, s 255. The Act does explicitly recognize that if the operation of the Act should result in the compulsory acquisition of property, the Commonwealth is liable to pay a reasonable amount of compensation; *ibid*, s 254.

183 The Commonwealth Government has recently committed to focus on infrastructure and supply measures, with only the residual amount of water recovery necessary to "bridge the gap" coming from water entitlement purchases. See Australia, *Agreement on Implementing*, *supra* note 102, s 3.1.

184 Australia, NWI, *supra* note 84, cl 47–48. See Michael Bennett, "Adjusting Collective Limits on the Use of Natural Resources" (2015) U of Tasmania L Rev 68 at 79–83 for a discussion of whether a share entitlement can be characterized as 'property' and whether a reduction in the collective limit, and a consequential reduction in share entitlement, may be considered a compulsory acquisition under s 51(xxxi) of the Australian Constitution.

185 See Bennett, *supra* note 184 at 83.

the Commonwealth Government.[186] However, it is these governments that bear the risks of any reduction or less reliable water allocation "arising from changes in government policy (for example, new environmental objectives)."[187]

NSW has acknowledged the *NWI* risk assignment provisions by making compensation conditional on a declaration by the Minister, when approving a plan or plan amendment, that the consumptive pool has been reduced by a change in the provisions of a WSP due to a change in state government policy,[188] or to provide additional water to the environment because of more accurate scientific knowledge that demonstrates that the amount previously allocated to the environment was inadequate.[189] However, as section 87AA(3) of the *Water Management Act* 2000 (NSW) makes clear, the holder of an access licence is not entitled to compensation under this section if:

> (c) the reduction in water allocations is for the purpose of restoring water to the environment because of natural reductions in inflow to the water source, including but not limited to changes resulting from climate change, drought or bushfires.

On its face, this provision seems to provide the flexibility necessary for adaptive measures, allowing adjustments to the consumptive pool to accommodate seasonal or long-term changes in the climate. However, the National Water Commission and other commentators have pointed to the practical difficulties associated with attributing a reduction in water allocation to climate change, government policy or new knowledge.[190] It is also open to the Minister to determine that it is in the public interest to compulsorily acquire a water access licence. However, if this occurs, the *Water Management Act* 2000 (NSW) provides that the person from whom the licence is acquired is entitled to compensation from the State for the fair market value of the licence.[191]

There are significant costs associated with the transition to the new water management regimes under both the *Water Management Act* 2000 (NSW) and the *Water Act* 2007 (Cth). Significantly, compensation is not owing when the state converts water licences issued under the *Water Act* 1912 (NSW) to share-based water access entitlements under the *Water Management Act* 2000 (NSW). Recognizing that there are costs associated with this transition, some licence

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186 Australia, NWI, *supra* note 84, cl 49. For water plans commencing or renewed after 2014, the risk is shared as follows: water access entitlement holders to bear the first 3% reduction in water allocation under a water access entitlement; State/Territory governments and the Commonwealth Government to share one-third and two-thirds respectively reductions in water allocation under water access entitlements of between 3% and 6%; and State/Territory and Commonwealth governments to equally share reductions in water allocation under water access entitlements greater than 6%.

187 *Ibid*, cl 50. The NWI also leaves open the possibility that affected parties, including water access entitlement holders, environmental stakeholders and the relevant government, may voluntarily agree to a different risk sharing formula.

188 See *WMA 2000*, *supra* note 10, s 87AA(5).

189 See *ibid*, s 87AA(6) (in this case, no compensation is payable for reductions of 3 percent or less and thereafter the risk is shared).

190 See Michael Bennett & Alex Gardner, "Groundwater Regulation in a Drying South West" (2014) University of Western Australia Faculty of Law Working Paper No 2014-42 at 67–68.

191 *WMA 2000*, *supra* note 10, s 79. The *Water Act 2007* (Cth) does not authorize the compulsory acquisition of water access rights; *supra* note 11, s 255.

holders have received "structural adjustment payments," funded in part by the Commonwealth government, to partially offset the loss.[192] The High Court of Australia has confirmed that even when the Commonwealth government is involved in the funding arrangements in this way, the Constitutional requirement that the Commonwealth acquire property "on just terms" is not engaged. [193] This is because, although a licence issued under the *Water Act* 1912 (NSW) may be a species of property, there is no "acquisition of property" when such a licence is replaced with a water access entitlement.[194]

3.4. Implications for Adaptive Management

The *Water Management Act* 2000 (NSW) establishes a comprehensive, integrated approach to the management of the surface and groundwater in NSW. Through the extensive and inter-jurisdictional planning processes, mandatory provisions for environmental water and flexibility provisions, the *Water Management Act* 2000 (NSW) creates a statutory framework designed to protect and restore water resources and dependent ecosystems, as well as allow for the adaptive management of the water resources in the State going forward. The *Water Act* 2000 (Cth) and the Basin Plan reinforce this approach across the MDB, mandating SDLs for the MDB as a whole, as well as for individual water resources, and requiring cohesive planning across the MDB. The environmental watering plans developed at the Basin and catchment level should work to optimize these environmental outcomes.

Granting perpetual water access entitlements to a share of the available resource allows water managers the flexibility to respond to seasonal and long-term changes in climate without the need to compensate the holders of water access entitlements for a reduced take. With extensive provisions for monitoring, reporting, and review of the key planning instruments at the heart of the *Water Management Act* 2000 (NSW) and the *Water Act* 2007 (Cth) the learning-by-doing model of adaptive management is not simply noted, it is embraced in the law. Overall, these reforms, and the multiple mechanisms built into the legislative regime to allow for adaptive management, seem well placed to deliver a water regime that allows for the sustainable use of water, with the necessary flexibility to adjust to changing water and climactic conditions. However, even though NSW has been in the process of significant water reform for almost two decades, the overall success of these reforms is still difficult to assess. This is due, in large part, to the complexity of the regulatory and planning framework found within both the *Water Management Act* 2000 (NSW) and the *Water Act* 2007 (Cth), the ambition of measures designed to protect environmental flows, and the time lags between implementation and observable impacts—all combined with the rapidly changing climatic conditions.

Of course, from an ecological perspective, the overall success of these water law reforms hinges on the balancing of rights and the setting of limits on extractive and consumptive uses. The amount of water set aside as planned environmental water under the *Water Management Act* 2000 (NSW) and the stringency of the long-term average SDLs set by the Basin Plan for

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192 See *ICM*, *supra* note 74 at paras 10-20.

193 See *ibid*. For a full discussion of the case, see e.g.: Andrew Macintosh & Jancis Cunliffe, "The Significance of ICM in the Evolution of s 51(xxxi)" (2012) 29 Environmental & Planning LJ 297; Penny Carruthers & Sharon Mascher, "The Story of Water Management in Australia: Balancing Public and Private Property Rights to Achieve a Sustainable Future" (2011) 1 Property L Rev 97.

194 See *ICM, supra* note 74 at paras 81–84.

water resources within the MDB determine the consumptive pool available for extractive uses. Establishing these limits is extremely complex, from both a scientific and political perspective, as exemplified by the debate around the SDLs proposed in the draft Basin Plan. As the amount of water available in the system becomes scarcer, these decisions become more difficult as decision makers continue to try and balance competing environmental, social, and economic objectives.

Finally, in the context of adapting to climate change, a major constraint identified in the scientific literature is a lack of understanding of potential adaptive responses and their effectiveness and the associated challenges of making decisions in the face of this uncertainty.[195] Ultimately, climate change may render this adaptive management exercise moot. As stated in the Intergovernmental Panel for Climate Change (IPCC) 5th Assessment Report, "if the extreme dry end of future water projections is realized [...], agriculture and ecosystems across southeastern and southwestern Australia would be threatened even with comprehensive adaptation."[196]

4. CANADA: BRITISH COLUMBIA

4.1. Context

BC is a large sub-national (provincial) jurisdiction in Canada composed of 925,186 square kilometres of land and 19,549 square kilometres of freshwater.[197] Although BC is hydrologically diverse, its population of 4,659,272 is highly concentrated in the southwest of the province, and thus water use is geographically concentrated as well.[198] More than 80 percent of the population lives on less than three percent of the provincial landscape, and it is on this same land that farmers produce over 80 percent of BC's gross farm gate receipts.[199] This small area supports an internationally recognized wine industry, several of the most prominent anadromous fish (salmon) runs in the world, and earns BC the designation as the largest producer of blueberries in Canada.

Incredibly, BC's hydrological diversity extends from the only desert-like landscapes in Canada to the most wet communities in the country. The desert-like landscapes with very low precipitation are found around the Thomson and Okanagan Valleys, which is just over 400 kilometres from Vancouver's coastal temperate rainforest zone that receives over 1100

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195 See Anthony Keim, "Drought and Water Policy in Australia: Challenges for the future illustrated by the issues associated with water trading and climate change adaptation in the Murray–Darling Basin" (2013) 23 Global Environmental Change 1615; Anthony Kiem & EK Austin, "Drought and the future of rural communities: opportunities and challenges for climate change adaptation in regional Victoria, Australia" (2013) 23 Global Environmental Change 1307.

196 Field et al, *supra* note 54 at 1389.

197 See Canada, Statistics Canada, "Land and Freshwater Area by Province and Territory" (1 February 2005), online: <www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/phys01-eng.htm>.

198 See British Columbia, BC Stats, "Quarterly Population Estimates 1972-2013" (18 March 2015), online: <www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationEstimates.aspx>.

199 See British Columbia, Provincial Agricultural Land Commission, *Planning for Agriculture, Resource Materials*, Barry Smith, ed, (Burnaby, BC: Provincial Agricultural Land Commission, 1998) at ch I-5 (using 2001 Statistics Canada data).

millimetres of precipitation per year.[200] Consistent with climate trends for North America, BC experiences increased precipitation from October to April and lower flows from May to September.[201]

BC is also complex in the diversity of water users and diversion scenarios. Unlike the large watersheds of the Canadian Prairie provinces (Alberta, Saskatchewan, and Manitoba) where a handful of irrigation districts control most of the allocated water, in BC there are 44,000 licences on 17,000 surface water sources.[202] Many of these water sources also support the 9662 anadromous salmon stocks that migrate between the ocean and freshwater bodies to spawn throughout most of the province.[203] These numbers underscore the complexity of water allocation in BC and the management challenge that such a geographically and hydrologically diverse province poses.

The provincial government licences use of 707 million cubic decametres (dam^3) of water.[204] Of that amount, 98 percent is for the non-consumptive use of waterpower or hydroelectric generation.[205] The remaining 14.6 million dam^3 is authorized for the following non-consumptive and consumptive uses: conservation and land improvement (59 percent); industrial and commercial (14.3 percent); waterworks (12.3 percent); agriculture (10.7 percent); aquaculture (2.6 percent); mining and petroleum (0.9 percent); and domestic (0.2 percent). Authorizations to store 99.5 cubic decametres are not included in these figures. Notably, short-term water authorizations to divert water for up to 24 months are not included in these figures and such short-term diversions would capture most of the water used in the oil and gas industry.

None of these figures include extraction of groundwater, as groundwater is not yet regulated in BC. There is no data on the number of groundwater users or the rate of groundwater extraction in the province. However, the provincial Observation Well Network, which observes 180 wells across the province, indicates some long term trends in specific areas.[206] Approximately 78 percent of wells have stable or increasing water levels, 13 percent

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200 See Canada, Statistics Canada, "Weather Conditions in Capital and Major Cities (Precipitation)" (23 August 2007), online: <www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/phys08a-eng.htm>.

201 See RT Watson, MC Zinyowera, RH Moss, eds, *The Regional Impacts of Climate Change: An Assessment of Vulnerability* (Cambridge: Cambridge University Press, 1997) at ch 8.3.3.

202 See British Columbia, Ministry of Environment, *British Columbia's Water Act Modernization: Discussion Paper* (Victoria, BC: Ministry of Environment, 2009) at 20 [BC, "Discussion Paper"]; Linda Nowlan & Karen Bakker, *Delegating Water Governance: Issues and Challenges in the BC Context* (Vancouver, BC: University of British Columbia Program on Water Governance, 2007) at 42.

203 See generally TL Slaney *et al*, "Status of Anadromous Salmon and Trout in British Columbia and the Yukon" (2011) 21:10 Fisheries 20.

204 See British Columbia, Ministry of Environment, "Amount of Surface Water Authorized to Be Used Annually in British Columbia" (March 14 2006), online: <www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/surface_allocation_volume_purpose.pdf>.

205 Only 611 licenses account for the hydropower allocation, with 46,367 authorizations for other uses. Note: one license may authorize more than one use; therefore there are more authorizations than licenses in the province (see *ibid).*

206 See British Columbia, Ministry of Environment, "Long-Term Trends in Groundwater Levels in BC" (June 14, 2014), online: <www.env.gov.bc.ca/soe/indicators/water/wells/index.html?WT.ac=LU_wells>.

have a moderate rate of decline and 9 percent have a large rate of decline.[207] Those with a large rate of decline are found in the driest area of the province, the Okanagan Valley, and the most populous areas that rely on ground water, the Fraser Valley near Metro Vancouver, and Eastern Vancouver Island.

In this context, until the last few decades of the 20th century there has been little concern about water management in BC due to the relative abundance of water and small population. However, as discussed below, over the past 20 years water conflicts have escalated in some areas, prompting the provincial government to modernize the water law regime and to address the need for adaptive management.

4.2. Historical Colonial Legal Regime

The history of colonial water law in BC is relatively straightforward. The provincial government developed the statutory water allocation regime over a 50-year period culminating in the first *Water Act* in 1909 that established the prior allocation system of licenced authorizations to take water. The 1909 legal structure is still largely in place and is therefore the main subject of BC's water law reforms addressed in this paper.

Prior to BC becoming a province of Canada, gold rushes, most notably the Fraser, spurred the regional government to enact the *Gold Fields Act* of 1859 to provide, for the first time, statutory allocation of water in BC.[208] Over the next several decades, laws relating to settlement and the facilitation of different sectors, such as agriculture,[209] enabled the acquisition of water rights for various uses until the provincial government consolidated a generic ability to allocate water in the *Water Act* in 1909.[210] The provincial government also created a Board of Investigation to adjudicate water allocations and claims. Over a ten year period, the Board attempted to bring all existing water users and their respective water uses under one set of allocation rules and to determine the priority of licenses.[211]

The focus of "western water law," as the various regimes in western North America have been called,[212] is to provide water users or licensees with security for investment in water

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207 See *ibid.*

208 *Gold Fields Act*, 1859, proclamation (UK).

209 See e.g. *Land Act*, SBC 1875, c 98, s 50. Any British subject could obtain pre-emption of land based on occupation and improvement of the land. Owners of water privileges or rights needed to construct a ditch to divert water.

210 See *Water Act,* SBC 1909, c 48.

211 See generally Bankes, *supra* note 14 at 219–245; William S Armstrong, "The British Columbia Water Act: The End of Riparian Rights" (1962) 1 UBC L Rev 583; British Columbia, Department of Lands, Forests and Water Resources, *Report of the Water Resources Service 1969* (Victoria: Province of British Columbia, 1970) at 15.

212 In the United States the western water law tradition of prior appropriation applies in the states of Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming. Hybrid regimes that include both prior appropriation and riparian rights are found in the states of California, Kansas, Mississippi, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Texas and Washington. See John W Johnson, *United States Water Law: An Introduction* (Boca Raton: CRC Press, 2009) at 303. In Canada, western water law still encompasses the provinces of Manitoba, Alberta, and British Columbia, see David R Percy, *The Framework of Water Rights Legislation in Canada* (Calgary: Canadian Institute of

infrastructure and to prevent water use conflicts by establishing priority of use between users or licensees.[213] In the western United States this is known as the doctrine of prior appropriation, where older water appropriators have water rights in priority to more recent takers of water.[214] A similar "first in time, first in right" (FITFIR) prior allocation approach applies under the legislated regulatory scheme in BC where more senior licenses take precedence over more junior (more recently granted) licenses issued by the provincial government.[215] The basic principles of the prior allocation regime in BC are that the provincial government asserts ownership over water flowing in streams and ground water,[216] and no person may take water from a stream without a licence except for domestic, fire suppression and mineral prospecting purposes.[217] Specific categories of users may obtain licences[218] that are attached or appurtenant to land, a mine, or an "undertaking".[219] Licences transfer with the appurtenant land or work when it is sold,[220] or by application to the provincial government,[221] which illustrates the specificity of a licence to a particular water supply and point of diversion.[222] Any use of water must be for the purposes listed in the *Water Sustainability Act* (*WSA*).[223] Essentially, water licensees must "use it or lose it," meaning that their failure to fully divert their licenced entitlement for more than three years may result in suspension or cancellation of all or part of the licence volume.[224]

Resources Law, 1988); Alastair R Lucas, *Security of Title in Canadian Water Rights* (Calgary: Canadian Institute of Resources Law, 1990); David R Percy, "Responding to Water Scarcity in Western Canada" (2005) 83(7) Tex L Rev 2091 at 2093.

213 See e.g. British Columbia, Department of Lands, Forests and Water Resources, *Report of the Water Resources Service 1963* (Victoria: Province of British Columbia, 1964) at 13.

214 See Charles F Wilkinson, "Aldo Leopold and Western Water Law: Thinking Perpendicular to the Prior Appropriation Doctrine" (1989) 24:1 *Land & Water L Rev* 1; Tarlock, *supra* note 34 at 882.

215 Both principles prior appropriation in the US and prior allocation in Canada are referred to as "first in time, first in right" regimes because of the priority given to older or more senior users either by common law or statute. See Alastair R Lucas, *Security of Title in Canadian Water Rights* (Calgary: Canadian Institute of Resources Law, 1990) at 11–16. See also Percy, *supra* note 36 at 316–318. However, prior appropriation rights can be treated as property rights whereas prior allocation grants a regulatory entitlement to use water. See Arlene Kwasniak, "Water Scarcity and Aquatic Sustainability: Moving Beyond Policy Limitations" (2010) 13:1 *U Denver Water L Rev* 321 at 327–330.

216 See *WSA, supra* note 12, s 5.

217 See *ibid*, s 6. The domestic use and mineral prospecting right to take water without a license is only available for water that is available to be licensed or unappropriated (*ibid*, s 42).

218 See *ibid*, s 9. Qualified to hold licenses are: an owner of land or a mine; a holder of a power utility permit (a certificate of public convenience and necessity); certain local governments such as municipalities; the governments of BC or Canada; an organization administering Crown land or a mine on Crown land; water districts established by provincial law; and BC Hydro.

219 See *WSA, ibid*, s 20(1–2).

220 See *WSA, ibid*, s 25(1).

221 See *WSA, ibid*, s 27.

222 See Percy, *supra* note 36 at 319.

223 *WSA, supra* note 12 at ss 1–2, 20(3)(c) and 30. The purposes defined in section 2 are conservation, domestic, industrial, irrigation, land improvement, mineralized water (bottling water), mining, oil and gas, power, storage and waterworks.

224 *Ibid,* s 94. Licensees must also pay for their water use. See *WSA, supra* note 12 at s 125; *Water Sustainability Fees, Rentals and Charges Tariff Regulations*, BC Reg 37/2016 Schedule 1.

Other ways to cancel a licence are limited to where the licensee contravenes the *WSA* or regulations, the conditions set out in the license itself, or orders of water officials.[225] Finally, security of entitlement and conflict resolution in times of water shortage relies on the principle of FITFIR, which grants more senior licence holders priority to take water over more junior licensees.[226] Once there is not enough water for all licensees, under the intent of FITFIR and following the letter of the law to its conclusion, the most junior licensee must cease diverting their entire licenced volume to accommodate more senior licensees. As flows decrease, this priority approach can continue until only the most senior licensees are still taking water,[227] or the comptroller or other decision maker under the *WSA* makes an order.[228]

This FITFIR regime has many shortcomings, with its inability to adapt to changing hydrological and socio-ecological circumstances at the forefront of the critiques.[229] The regime offers no ability to alter the volume of water licensees being diverted except through short-term orders that are issued by the provincial government, which lacks administrative capacity in the form of hydrological data and staff resources. In addition, the FITFIR regime is not based on hydrological reality. There are no environmental flow requirements and groundwater is not included in the regulations. This can lead to over-allocation in specific watersheds and carries the risk of licences becoming paper rights, as even the highest seniority does not necessarily guarantee water availability.

Finally, the oldest and ongoing incidents of water diversion and reliance on flows in BC—those of indigenous communities for food, social, ceremonial and commercial purposes—are not quantified and factored into the hydrological balance of each watershed. Water is incidental to existing Aboriginal rights such as the rights to fish, gather food and carry on ceremonial activities in the riparian environment.[230] In some circumstances, water would also be "integral to the distinctive culture of the particular aboriginal people."[231] Irrespective of the Crown's constitutional duty to recognize and affirm existing Aboriginal rights and the burden that this duty places on the Crown's assertion of ownership of water, it is impossible to take a

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225 *Ibid,* s 8.

226 See *ibid*, s 22. In the rare circumstance where two licenses on the same reach of a waterbody have the same date, priority is determined by the license's purpose and where it falls in the ranking of statutory purposes. See *ibid*, s 22(7). This hierarchy, from highest to lowest rank, is: domestic, waterworks, irrigation, mineralized water, mining, industrial, oil and gas, power, storage, conservation, and land improvement purposes.

227 The *WSA* requires that all licenses must have a date when issued (*ibid*, s 20(3)). It also requires that "…rights exercisable under an authorization that authorizes the diversion of water from a stream have precedence in relation to the rights of other authorization holders who divert water … according to the dates set out in the authorizations as the dates from which the rights take precedence" (*ibid*, s 22(1)).

228 For example, under s 93(2)(i) of the *WSA*, the comptroller, regional water manager or engineer may regulate and make orders with respect to the diversion, rate of diversion and use of water.

229 See Percy, *supra* note 36 at 321; Tarlock, *supra* note 34 at 891–892. See generally Jonathan H Adler, "Water Rights, Markets, and Changing Ecological Conditions" (2012) 42:1 Envtl L 93 at 102; Michael Toll, "Reimagining Western Water Law: Time-Limited Water Rights Permits Based on a Comprehensive Beneficial Use Doctrine" (2011) 82:1 U Colo L Rev 595 at 608–609.

230 For example, courts will restrain activities that may affect habitat and thus a treaty or aboriginal right to fish. See e.g. *Saanichton Marina Ltd v Claxton* 36 BCLR (2d) 79, 57 DLR (4th) 161.

231 *R v Sappier; R v Grey* 2006 SCC 54 at para 37, [2006] 2 SCR 686 Bastarache J.

meaningful account of the water balance in any watershed without considering the Aboriginal rights that implicate water. Although many First Nations use water under licence through the colonial regime and a few have minor allocations through modern treaties,[232] there is no reconciliation of Aboriginal or indigenous interests in water with the colonial regime in place.

In this context, the provincial government has made minor amendments to BC's FITFIR regime that relate to adaptive management, including the ability to hold water licences for conservation, make orders related to environmental flows, and undertake water management planning. The legislature amended the *Water Act* in 1953 to allow licences for conservation purposes,[233] permitting the diversion of water to protect fish and wildlife. While conservation licences are a step towards recognizing environmental flows, they only protect the specific ecological features of fish and wildlife and require use, works, or the storage of water—therefore not allowing water to be left instream to supplement existing flows.[234] In 1997 the legislature also enacted the *Fish Protection Act*, which enabled the Minister to make orders to cease diverting water when fish populations are threatened.[235] Prior to this provision's repeal in 2014, the Minister has only ever issued one order,[236] even though there are other examples of threatened fish populations in the province.[237] The final amendment that relates to adaptive

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232 For example, the Nisga'a Treaty (1999) expresses Nisga'a water rights through the colonial water law regime. Under this treaty, the Crown has ownership and regulatory authority over water, existing water licenses remain in force, and the Nisga'a Nation has a water reservation of 300,000 cubic decametres of water per year (approximately one percent of the annual average flow of the Nass River) that can be converted to water licenses with a priority date of 1996 for domestic, industrial and agricultural purposes. *Nisga'a Final Agreement*, 27 April 1999, ss 3.122–3.124 [entered into force 4 May 1999]. Similarly, the *Maa-Nulth Treaty* (2009) establishes a water reservation for each signatory First Nation that can be converted into water licenses for domestic, agricultural and industrial uses with a priority date of October 2003. *Maa-Nulth First Nations Final Agreement*, 9 April 2009, s 8.4. Finally, while there are no provisions relating to water allocation in the Tsawwassen Nation treaty that secures Tsawwassen Nation membership in the Greater Vancouver Regional District, including the right to participate in the Greater Vancouver Water District. *Tsawwassen First Nations Final Agreement,* 6 December 2007, ch 17.1–17.2.

233 See *Water Act Amendment Act,* SBC 1953, c 38 (2nd Sess), s 2; *Harvey v British Columbia (Assistant Regional Water Manager)* (2004) WAT-008(a) at 5 G(BC Environmental Appeal Board) [*Harvey*].

234 "Conservation purpose" under s 2 of the *WSA* means the diversion, retention or use of water, including the construction of works for that purpose, for the purpose of conserving fish or wildlife; *supra* note 12. In *Harvey*, *supra* note 233*,* a landowner appealed the Ministry of Environment's rejection of an application for a water license for the purpose of conserving an ecologically sensitive pond. The Board members ruled that a license for conservation purposes is required only when works, diversion or use is contemplated. In this case there was no use of the water, it was to be left in the water source, and therefore there was no basis on which to award the water license.

235 *Fish Protection Act,* SBC 1997, c 21, s 9 (repealed in 2014).

236 The Minister of Environment issued an order to the Quilchena Cattle Company to cease taking water under licence for irrigation purposes for 13 days in September 2009 in response to low flows on the Nicola River when the flow of water was less than 0.35 cubic metres per second. British Columbia, Ministry of Environment, *Order of the Minister of Environment Fish Protection Act,* 17 September 2009 (on file with author).

237 See e.g. British Columbia, Madrone Environmental Services Ltd and Cowichan Valley Regional District*, supra* note 2. It is important to note that concerns about fish health also motivated other provincial law reform, including the *Riparian Areas Regulation*, BC Reg 376/2004, pursuant to section 12 of the *Fish Protection Act*, *supra* note 235. Section 12 requires that a riparian assessment within a mandated setback from a fish-bearing watercourse for land development applications to designated local governments. A

management is the enabling of water management planning in 2004.[238] With this amendment, the Minister could designate an area for a water management plan to address conflicts between water users and between users and environmental flows, or risks to water quality. It was possible that the water management plan could become binding through regulation.

While these legal reforms do not address many of the criticisms aimed at the FITFIR regime in BC, water management has continued to be relatively uncontroversial when compared with other western water law jurisdictions in North America. For example, while Oregon and California are well known for their high profile conflicts over water allocation and availability,[239] the BC regime is rarely called into question.[240]

However, ecosystem-specific weaknesses are beginning to show. In the desert-like climate of the Okanagan watershed, 235 of 300 streams are over allocated[241] and groundwater is declining and becoming increasingly contaminated in some aquifers such as the Hopington Aquifer located in BC's primary farming area, the Fraser Valley.[242] As discussed in the introductory paragraph of this paper, in the Cowichan River there have been chronically low water flows over the past decade, such that there are regular accounts of volunteers trucking salmon up the River so they can spawn.[243] Additionally, due to several incidents of significant fish mortality caused by water management for hydroelectric power, the provincial government required BC Hydro, the primary electricity utility, to develop water use plans between 1998 and 2011for 15

registered professional must sign off on the placement of new development and state that there will be no adverse fish habitat impacts or make recommendations for mitigating those impacts.

238 See *Drinking Water Protection Act*, SBC 2001, c 9, s 97, brought into force by the *Ground Water Protection Regulation*, BC Reg 299/2004. Water Management Plans are now Water Sustainability Plans pursuant to ss 64–85 of the *WSA*, *supra* note 12.

239 See e.g. Glen Spain, "Dams, Water Reforms and Endangered Species in the Klamath Basin" (2007) 22:1 J Envtl L & Litig 49 at 53, discussing the longstanding conflict in the Klamath basin of northern California and southern Oregon and noting, "[w]idespread water over-appropriation and short-sighted water mismanagement have been the rule rather than the exception". See generally Holly Doremus & A Dan Tarlock, *Water War in the Klamath Basin: Macho Law, Combat Biology, and Dirty Politics* (Washington, D.C.: Island Press, 2008).

240 A Westlaw Canada search on November 8 2014 of appeals from decisions made under the *Water Act* to the Environmental Appeal Board over the past twenty years (1993–2013) produced 162 results. There are drastically fewer cases that subsequently went on to the BC courts. In the past five years, the *Water Act* was the subject matter of only five BC Supreme Court cases.

241 See Diana Allen, "Understanding Threats to Groundwater in Okanagan Basin: Vulnerability and Sustainability" (Presentation delivered at the Ground water in the Okanagan Symposium, 23 January 2007), as quoted in Nowlan & Bakker, *supra* note 202 at 50.

242 See Township of Langley, Ministry of Environment & Ministry of Agriculture and Lands, "Township of Langley Water Management Plan: Final Report" (Langley: Township of Langley, 2009) at 26–27, online: <www.compassrm.com/database/rte/files/Township%20of%20Langley%20WMP%20-%20Final%20Report.pdf>. See also British Columbia, Ministry of Environment, "An Aquifer Classification System for Groundwater Management in British Columbia", online: <www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/aquifers/Aq_Classification/Aq_Class.html#results>.

243 See "Cowichan Area Faces Water Crisis After Prolonged Dry Weather", *Times Colonist* (2 August 2014), online: <www.timescolonist.com/news/local/cowichan-area-faces-water-crisis-after-prolonged-dry-weather-1.1273697>.

watersheds.[244] Finally, First Nations are increasingly challenging water allocation and diversion decisions made by the provincial government that fail to acknowledge Aboriginal rights.[245]

It was this steady increase in conflict between water users and between water users and environmental flows, particularly flows for fish, as well as the assertion of Aboriginal rights to water that stimulated the reform of BC's *Water Act*.

4.3. Law Reform

In 2008, the provincial government made a commitment to update the water law regime pursuant to its comprehensive water management policy titled *Living Water Smart*.[246] The policy's pledge to law reform focused, in particular, on healthy environmental flows. One year after the creation of this policy, the Ministry of Environment commenced the *Water Act* Modernization Project (WAM), which occurred over four years and involved a significant level of public and sectoral engagement.[247] This engagement resulted in significant input from

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244 See James Mattison et al, *Water For Power, Water For Nature: The Story of BC Hydro's Water Use Planning Program* (Vancouver: World Wildlife Federation Canada, 2014).

245 See e.g. *Halalt First Nation v British Columbia (Minister of the Environment)*, 2011 BCSC 945 Wedge J, which was reversed by *Halalt First Nation v British Columbia (Minister of the Environment),* 2012 BCCA 472 Chiasson JA, and leave to appeal to SCC refused, *Halalt First Nation v British Columbia (Minister of the Environment)* (July 11, 2013), Ottawa, SCC 35179 (application for leave) (a challenge to the construction of three municipal wells that would affect the Chemainus River for which the First Nation claimed Aboriginal rights); *Saik'uz First Nation and Stellat'en First Nation v Rio Tinto Alcan Inc*, 2015 BCCA 154 Tysoe JA (an action in nuisance for the unreasonable and severe interference with the plaintiffs' proprietary rights from the construction of the Kenney Dam and diversion of the Nechako River in an area for which the First Nations claim Aboriginal title and rights); and *Chief Richard Harry in his own right and on behalf of the Xwemalhkwu First Nations v Assistant Regional Water Manager* (2011) WAT-005(c) and 006(c) (British Columbia Environmental Appeal Board) (a challenge of water licences issued for diverting water for bottling in an area to which the First Nation asserts Aboriginal rights and ownership over the water resources).

246 British Columbia, Ministry of Environment, *Living Water Smart: British Columbia's Water Plan* (Victoria: Province of British Columbia, 2008), online: <www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-planning/livingwatersmart_book.pdf>. Policy commitments to law reform include: by 2012, water laws will improve the protection of ecological values, provide for more community involvement, and provide incentives to be water efficient (*ibid* at 45). Legislation will recognize water flow requirements for ecosystems and species; by 2012 (*ibid* at 45). government will regulate ground-water use in priority areas and large ground-water withdrawals (*ibid* at 49).

247 For example, British Columbia sought input in response to a (1) discussion paper, BC, "Discussion Paper", *supra* note 202, (2) a policy proposal, British Columbia, Ministry of Environment, "British Columbia's Water Act Modernization: Policy Proposal on British Columbia's New Water Sustainability Act" (Victoria, BC: Ministry of Environment, 2010), online: <www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-planning/wam_wsa-policy-proposal.pdf>, and (3) a proposed legislative framework, British Columbia, Ministry of Environment, *A Water Sustainability Act for BC: Legislative Proposal* (Victoria, BC: Ministry of Environment, 2013), online: <engage.gov.bc.ca/app/uploads/sites/71/2013/10/WSA_legislative-proposal_web-doc.pdf> [BC, "Legislative Proposal"]. Staff also hosted public meetings, meetings with First Nations, and consulted with a multi-stakeholder Technical Advisory Committee; see British Columbia, Ministry of Environment, *British Columbia's Water Act Modernization Report on Engagement* (Victoria, BC: Ministry of Environment, 2011) at 12, online: <www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-planning/wam_report-on-engagement.pdf>.

stakeholders in the form of written submissions and comments posted via the WAM website.[248] The WAM process culminated in the new *Water Sustainability Act* (the *WSA*) coming into force on February 29, 2016. The process of adopting the *WSA* involved tabling a series of regulations, including one that required groundwater licencing for the first time.[249]

The *WSA* stays true to the policy commitments made in 2008. It allows for the integration of water and land use decisions through water sustainability plans and water objectives. It also mandates the consideration of environmental flows when making decisions about new water licences, and finally, brings groundwater into the water licencing regime to capture the entire hydrologic platform in water management. *The WSA* also explicitly provides for the review, amendment, and adaptation of water licences. This is the first time that a provincial regulatory authority in western Canada has done so explicitly. However, these progressive adaptive features are tempered by *the WSA's* reliance on the existing FITFIR licence priority regime and extensive administrative discretion, including carving out details and exceptions to adaptive management through regulation while leaving broader interests in water related to Aboriginal rights unrecognized. The existence of exceptions to licence review and adaptation, including the need to compensate some licensees for changes to their entitlements, as well as the failure to include the quantification of water attached to existing Aboriginal rights render the effectiveness of the *WSA* in addressing the adaptive management imperative uncertain.

4.3.1. Integration

The *WSA* mandates the integration of both hydrological and spatial factors into decision-making that affects water. It addresses groundwater and ties some land use decisions to their impacts on water, the riparian and instream environments. Most notably, as one of the last jurisdictions in North America to do so, the *WSA* incorporates groundwater into BC water management through water licencing and decision-making. The legislative drafters of the *WSA* added aquifers to most existing and new surface water management provisions. For example, the Crown reaffirms that the property in and right to use water in both streams and groundwater is vested in the Crown[250] and, subject to legislated exemptions, people are prohibited from diverting water from a stream or aquifer without a licence.[251] Water reservations may occur for

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248 For example, over the one-month comment period for the Legislative Proposal, viewers visited the website over 12,000 times and provided over 3000 submissions; see Province of BC. "Water Sustainability Act 2013-2014: Development of Bill 18 and Royal Assent", online: <engage.gov.bc.ca/watersustainabilityact/2013-2014/>. The submissions are archived on the website and can be accessed by name of organization or individual, or by stakeholder category; see British Columbia, Ministry of Environment, "Water Sustainability Act: Ensuring our water stays healthy and secure – Public Submissions", online: <engage.gov.bc.ca/watersustainabilityact/what-weve-heard-2/>.

249 See *Water Sustainability Regulation*, BC Reg No 36/2016.

250 *WSA*, *supra* note 12, s 5. Since 1995, the Crown had asserted "property in and the right to use" groundwater and surface water through the *Water Protection Act*, RSBC 1996, c 484, s 3(2) (now repealed but this same wording is now found in the *WSA*). However, for the first time in the *WSA,* the Crown asserts ownership to both surface and groundwater in the same primary water allocation and regulation law.

251 *WSA*, *supra* note 12, s 6(1).

both streams and aquifers[252] and critical environmental flow protection thresholds implicate the aquifers to which a stream is hydrologically connected.[253] While it appears absurd to applaud a regulatory regime that accounts for interconnected sources of water, the *WSA* has now, in practice, made a comprehensive approach to water management in BC possible.

The *WSA* also builds on an unused authority to undertake water management plans.[254] These new water sustainability plans (WS Plans) result from an area-based process by which parties focus on conflicts over water, environmental health and water conservation. The Minister may order that an area be subject to a WS Plan's process if the plan will assist in preventing or addressing conflicts between water users or the needs of water users and environmental flow needs, risks to water quality, or aquatic ecosystem health, or will identify restoration measures in relation to damage aquatic ecosystems.[255] Although the scope of any WS Plan is limited by its terms of reference, the *WSA* sets out explicit implementation authority that can allow a WS Plan to amend or trump existing water licences or decision-making jurisdiction of public officers under any enactment.[256] The provincial cabinet may implement a WS Plan by regulation that can:[257]

- Require that the plan be considered by a public officer making a specified decision;[258]
- Restrict the issuance of a specific land or resource instrument or the approval of a plan;[259]
- Restrict or prohibit an identified use of land or natural resources, or an activity;[260]
- Amend the terms and conditions of water licences;[261]
- Reduce the maximum rate of diversion of water under a licence;[262]

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252 *Ibid*, s 39. The Crown may reserve unrecorded water for specific purposes from being used and diverted under the *WSA*.

253 *Ibid*, s 87(1)(b).

254 The authority for water management planning was found in Part 4, ss 62–67 (now repealed), of the *Water Act*, *supra* note 12. It is now located at Part 3 Division 4, ss 64-85 of the *WSA*. However, the province has not adopted any water management plans using this authority. See BC, "Discussion Paper", *supra* note 202 at 7.

255 *WSA*, *supra* note 12, s 65.

256 Indeed, the *WSA*, *ibid*, specifically contemplates regulations that effect statutory decisions (*ibid,* s 76), effect approvals by subdivision approving officers (*ibid,* s 77), restrict or prohibit the use of land or resources (*ibid,* s 78), reduce water rights (*ibid,* s 79), direct works or operations (*ibid,* s 80), effect other planning processes (*ibid,* s 81), reserve water for agriculture (*ibid,* s 82), and restrict activities affecting groundwater (*ibid,* s 83).

257 *Ibid*, s 75.

258 *Ibid*, s 76(2)(a).

259 *Ibid*, ss 76(2)(b), 77(2)(a).

260 *Ibid*, ss 78(1)(a)–78(1)(b).

261 *Ibid*, s 79(1)(a).

262 *Ibid*, s 80(1)(a).

- Alter, install, repair or replace works, including for the more efficient use or conservation of water, and adopt a more efficient practice;[263] and
- Restrict or prohibit activities relating to ground water.[264]

This ability to implement watershed or area-based WS Plans—which include consideration of both ground and surface water—by amending existing water entitlements and directing that decisions relating to land and water be made in a specific way—creates possibilities for adapting water management in areas where there are conflicts over water. Through a consultative planning process under the WS Plan regime,[265] the intent is for local authorities and stakeholders to craft place-based hydrologically-appropriate approaches to the water quantity and quality issues they are facing. The WS Plans are not limited to water allocation but may also consider water quality, drought planning, water sharing, and other solutions that meet local socio-ecological needs. The extension of the regime to groundwater, water sustainability planning, and the possibility of considering water in some land use decisions integrates water into the broader context of environmental management that is predicated on adequate flows for a healthy ecosystem.

4.3.2. Environmental Flows

The *WSA* approaches environmental flows and riparian health comprehensively.[266] Beginning with attention to minimum environmental flows, decision makers must consider the environmental flow needs of a stream when evaluating a water licence application for a stream or aquifer, except for decisions exempted by regulation.[267] The decision maker must determine the environmental flow needs of a stream, as directed by regulation, and can require an applicant to provide information, reports and assessments as part of the licence application process.[268] The Minister may make regulations respecting environmental flow needs, including prescribing methodologies for their calculation.[269] In addition, decision makers may require mitigation measures on streams and sensitive streams if the proposed diversion and use of water or changes in and about a stream are likely to have significant adverse impact on water quality, quantity, or aquatic ecosystem of a stream or aquifer, a stream channel or other uses of water from a stream or aquifer.[270]

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263 *Ibid*, s 80(1)(c)–80(1)(d).

264 *Ibid*, s 83(1).

265 There is considerably more details to the WSP regime, which includes mandatory terms of reference and notice to affected persons. See *ibid*, ss 64–85.

266 The Act includes several definitions related to the ecological functions of water. These include: "aquatic ecosystem" means living organisms and their life processes dependent on the natural environment of a stream; "critical environmental flow threshold" means the volume of water flow below which significant or irreversible harm to the aquatic ecosystem of the stream is likely to occur; and "environmental flow needs" means the volume and timing of water flow required for proper functioning of the aquatic ecosystem. See *ibid*, s 1.

267 *Ibid*, s 15(1).

268 *Ibid*, s 15(2).

269 *Ibid*, s 127(1)(o).

270 *Ibid*, ss 16–17.

These environmental flow and mitigation provisions apply prospectively to new applications for water licences and do not address the impact of existing licences on changing hydrological conditions. However, the *WSA* also provides for administrative temporary protection orders to safeguard riparian areas, aquatic ecosystems, and fish. If the Minister or provincial Cabinet has made a declaration of significant water shortage,[271] the comptroller may determine the critical environmental flow threshold for each stream in an area that has a regionally significant aquatic ecosystem, where water is being diverted from the stream or a hydrologically connected aquifer, and where enforcing the critical environmental flow threshold will assist in preventing significant or irreversible harm to the aquatic ecosystem.[272] These thresholds act as an order because they have precedence over water rights[273] and are final such that they may not be appealed.[274]

The Minister may make similar temporary fish population protection orders if the Minister considers that the flow of water in a specified stream is, or is likely to become, so low that the survival of a fish population may be, or may become, threatened. Regardless of the precedence of water licences, the order can address the diversion, rate of diversion, time of diversion, or use, including storage and time of storage, of water from the specified stream, or a specified aquifer hydraulically connected to the stream.[275]

From an ecological perspective where adaptation is possible, the *WSA* brings water management in BC out of a purely consumption-based regime into a management regime that is predicated on adequate ecological flows. The effectiveness of this attention to environmental needs will depend on the strength and adaptive management of future policy and regulation for environmental flows as well as the willingness of the provincial government to make orders. Currently, BC has a one-size-fits-all province-wide policy that establishes a risk-based standard for determining environmental flow needs over all diverse ecosystems,[276] and which acknowledges the need for adaptive management.[277] Unlike NSW, this policy is applied only when considering applications for new licences and not on an annual cycle based on actual precipitation and flow. However, when read within the context of the entire *WSA* regime that permits the modification of licences over time and for which no compensation is owed, the adaptive management potential of the new water law becomes clearer.

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271 *Ibid*, s 86. These orders can endure for up to 90 days (*ibid* s 86(2)).

272 *Ibid*, s 87(1).

273 *Ibid*, s 22(9).

274 *Ibid*, s 87(3).

275 *Ibid*, s 88.

276 See British Columbia, Ministry of Environment & Ministry of Forest, Lands and Natural Resource Operations, "Environmental Flow Needs Policy", (February 29 2016), online: <www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/efn_policy_mar-2016_signed.pdf>.

277 The policy states: "The field of environmental flow needs is an emerging science with large uncertainties in flow alteration and ecosystem response. Over time, an adaptive management approach with monitoring and site-specific detailed studies will build our body of knowledge and potentially lead to refinements in the policy. Adaptive management is particularly important with climate change projections for shifts in streamflow hydrographs and increasing variability" (*ibid,* s 6.3).

4.3.3. Flexibility in Water Entitlements: Regulation and Compensation?

The *WSA* explicitly addresses the rigidity of historic Western water law and perpetual licences, as well as embraces adaptive management. It does so using two key approaches: enabling licence review and amendment and declaring that there will not be any compensation for changes to water licences. However, unlike NSW there is no provision in the BC regime for water markets. As one of the economic instruments discussed as a means of improving water security,[278] the public outcry against the possibility for water markets was severe and the issue garnered significant negative media coverage.[279] Although water markets are not enabled in the *WSA*, WS Plans could create localized water trading mechanisms.

Most licences may be subject to review and amendment every 30 years.[280] Statutory decision makers may notify licensees any time after 30 years from the date the *WSA* comes into force and 30 years after a previous review, and those licensees must submit to a review of the terms and conditions of their licence.[281] The decision maker may review the terms and conditions of a licence taking into account:

- The best available technology in respect of water use efficiency and water conservation;
- Test practices in respect of water use efficiency and water conservation; Any increase in knowledge respecting actual stream flow or aquifer conditions;
- The effects of climate change;
- The licensee's beneficial use of the water;

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278 See BC, "Discussion Paper", *supra* note 202 at 11; British Columbia, "British Columbia's Water Act Modernization: Technical Background Report" (Victoria, BC: Ministry of Environment) at 49.

279 See e.g. Norman Hill, "Action Alert: Stop the Introduction of a Water Market in the BC Water Act!", *Vancouver Council of Canadians* (4 February 2011), online: <vancouvercouncilofcanadians.ca/2011/02/action-alert-stop-the-introduction-of-a-water-market-in-the-bc-water-act/>; Randy Christensen, "B.C.'s Water to be Sold to the Highest Bidder?", (17 February 2015) *EcoJustice* (blog), online: <www.ecojustice.ca/b-c-s-water-to-be-sold-to-the-highest-bidder/>. The provincial government clarified in a blog post that it had no intention to privatize water. See British Columbia, "What Do We Mean By Water Markets and Water Rights Trading?", online: <blog.gov.bc.ca/livingwatersmart/2011/01/28/what-do-we-mean-by-water-markets-and-water-rights-trading/>; British Columbia, "Water Markets: Not About Privatizing BC's Water" (1 February 2011) *Living Water Smart* (blog), online: <blog.gov.bc.ca/livingwatersmart/2011/02/01/water-markets-not-about-privatizing-bc's-water/>.

280 The review and amendment provisions apply to licenses issued on or before the date this section comes into force for an unlimited period or has at least 30 years remaining in its term, or issued after the date the section comes into forces for an unlimited period or a term exceeding 30 years. There are three types of licenses that the *WSA* excludes from review and amendment: those issued for a power purpose or storage purpose related to a power purpose issued after October 23rd, 2003 (after which time all hydropower licenses contained a 40 year expiration date); issued under the *Industrial Development Act*, RSBC 1996, c 220 (relating to the development of hydropower for aluminum smelting and specifically to the Rio Tinto Alcan hydro projects around Kitimat); or, issued following a review under the Water Use Plan directives published by government December 1998 (the Water Use Planning processes addressed fisheries and other concerns for large scale hydro users; see e.g. BC Hydro, British Columbia, Ministry of Environment, "*Water Use Plan Guidelines",* online: <www.env.gov.bc.ca/wsd/>. See also *WSA*, *supra* note 12 at s 23(1).

281 *Ibid*, s 23(2).

- The use, operation or maintenance of works; and
- Other prescribed factors.[282]

As part of the review, the decision maker may amend the terms and conditions of licences to promote water conservation or the more efficient use of water by reducing the rate of diversion, changing the time of diversion or use, altering works, or requiring a more efficient practice under the licence.[283] If the licence amendments substantially change the licence, the decision maker may substitute a new licence that has the same precedence as the replaced licence.[284]

This review provision does two things clearly. It provides notice to most licensees holding perpetual licences or licences that endure for more than 30 years, that their licence entitlements are, with specific notice, subject to review and amendment. It also outlines a framework for water licence review and adaptive management that is based on water conservation and water use efficiency given technological advances and changing hydrological conditions.

In many jurisdictions, the legal ability to amend licences would need to be accompanied by a budgetary allocation to pay licensees for permanent reductions in water volumes. At one end of the spectrum of compensation versus regulation without compensation, litigation in the western United States has expressed the view of water as a property right that must be compensated when "taken" by the state.[285] As explained above, although not required by law, the State of NSW paid partial compensation to some water licence holders when the state transitioned their licences to water access entitlements under the *Water Management Act* 2000 (NSW). However, it is clear that after this transition NSW will not compensate further adjustments to accommodate seasonal and long-term changes. At the other end of the compensation spectrum, the *WSA* takes a very Canadian approach to adapting what is a regulatory authorization or a use entitlement—when licence entitlements change due to regulation or review and amendment, the government will not pay any compensation for those changes.[286] No compensation is payable by, and no legal proceedings may be maintained

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282 *Ibid*, s 23(6).

283 *Ibid*, s 23(7). At the same time, the Province of BC may make regulations for the beneficial use of water, including establishing requirements relating to the use of best available technology for water use efficiency and water conservation. See *ibid*, s 127(1)(b).

284 *Ibid*, s 23(8).

285 See e.g. *Tulare Lake Basin Water Storage District v United States,* 49 Fed Cir 313 (2001), an early U.S. case where the court found that regulated reductions in water extraction under license due to low flow conditions and concern for endangered species were a physical taking of private property. The Alberta *Water Act*, RSA 2000, c W-3 reflects this approach. The terms of a deemed license authorizing water rights prior to 1999 take precedence over the *Water Act*, *supra* note 12, itself (s18(2)(b)) and water licensees must be compensated when the Director amends, suspends or cancels licenses for conservation purposes, subject to contrary intention expressed in regulations (*ibid*, s 158(1)). For more discussion in this area, see Deborah Curran, "British Columbia's Water Sustainability Act – A New Approach to Adaptive Management and No Compensation Regulation" (28 May 2014) *The University of Calgary Faculty of Law Blog on Developments in Alberta Law (blog),* online: <ablawg.ca/wp-content/uploads/2014/05/Blog_DC_Bill_18_May-2014.pdf>.

286 What is meant here by a "Canadian" approach is that regulatory takings, or compensation for reductions in value of land or losses due to regulation are very rare in Canada. While there is no case law in Canada in the water context, drawing analogies from the regulation of land is instructive. There are no

against, the government in relation to loss or damage to rights under licence or other approvals arising from a change in the precedence of water rights or restrictions on the exercise of these rights.[287] It is clear that the activities that could attract this alleged loss or damage for which no compensation is owed include action in furtherance of adaptive management—a restriction on the exercise of rights, or a change or imposition of new terms and conditions on a licence.

Notably, there are two exceptions to this no compensation rule. The provincial executive may make regulations respecting when the government must pay compensation,[288] and if a WS Plan recommends a significant change to a licence or drilling authorization, [289] the WS Plan must contain a detailed proposal assigning responsibility for compensating the licensee or drilling authorization holder and a statement of sources of funding to pay compensation.[290]

These two approaches—the ability to review and amend licences over the long term and the ability to do so without paying compensation—provide a clear legal mechanism for adapting entitlements to use water. When considered with environmental flow requirements and water sustainability planning that includes ground water, the *WSA* incorporates the legal elements necessary for an adaptable water management regime.

4.4. Implications for Adaptive Management

On its face, the new *WSA* makes BC one of the most ecologically-responsive and regulatorily-adaptive jurisdictions on the globe. The water management regime integrates decisions about surface and groundwater, and mandates healthy baseline ecological conditions. Although there will be a lag between the current ecological status of any watershed and the new-normal promoted by the *WSA* as regulations and decisions take environmental flows into account, once that ecological function is achieved the regime is well placed to adapt to changing hydrological conditions through WS Plans and their implementation by regulation that can shape decisions and alter licence terms and conditions. Provisions for long-term licence review and amendment sidestep the rigidity of perpetual licences. The rejection of compensation makes licence review and amendment in furtherance of adaptive management more financially feasible than if each amendment triggered a need for compensating the licence holder.

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constitutionally protected property rights in Canada and typically Canadian governments can restrict virtually all uses of land without compensating the landowner. See e.g. *Local Government Act*, RSBC 1996, c 323, s 914 and Alberta *Municipal Government Act*, RSA 2000, c M-26. No Canadian court has ever found municipal land use regulation to result in a regulatory expropriation. See e.g. *Mariner Real Estate Ltd v Nova Scotia (Attorney General)*, [1999] 178 NSR (2nd), 177 DLR (4th) 696 and *Canadian Pacific Railway Co v Vancouver (City),* 2006 SCC 5, 1 SCR 227. Canadian courts have awarded compensation for loss of mineral rights upon the creation of a park. See *R v Tener* [1985] 1 SCR 533; *Casamiro Resource Corp v British Columbia (Attorney General)*, 80 DLR (4th) 1; 55 BCLR (2d) 346 (BCCA). Canadian courts have also awarded compensation for the removal of all economic viability, including goodwill (*Manitoba Fisheries Ltd v The Queen*, [1979] 1 SCR 101.

287 See *WSA*, *supra* note 12, s 121.

288 See *ibid*, s 134.

289 The *WSA* defines "significant change" under a WSP as a change, whether mandatory or voluntary, that would significantly reduce the quantity of water a license is authorized to divert, result in significantly different works required under a license, restrict the water use purposes for which the water may be used, or cancel a license or drilling authorization (*ibid*, s 64).

290 See *ibid*, s 74(2)–74(3). A compensation plan is required only for WSP's submitted to the Minister.

However, even with this suite of significant changes that set a new standard for ecologically-centered and adaptive water management, there are still several fundamental characteristics of the BC water management regime that makes timely adaptation uncertain. There are two problems within the *WSA*, relating to the amendment of licences after 30 years and the exceptions to the no compensation rule. Two more fundamental issues are the Crown's assertion of the administration of water and lack of responsiveness, as well as the unresolved Aboriginal rights related to water in BC.

Outside of water sustainability planning and season—and watershed-specific orders—adaptive management in the form of licence amendments provided for in the *WSA* is, at minimum, 30 years in the future. It is understandable why the provincial government chose this approach. They are putting all licence holders, most of whom hold licences that have no end date, on notice that their licences will be subject to review and amendment without compensation. In the short-term, water decision makers will address conflicts over water and emergencies relating to ecological conditions through administrative orders. While this approach seemingly thwarts the fiscal issue of compensation, significant hydrological and socio-ecological changes will occur over the next 30 years with water conflicts becoming more acute. Unless significant resources are committed to water planning and administrative responsiveness such that orders are timely enough to be effective, some watersheds in BC could suffer irreparable harm before adaptation of licences can occur on an appropriate scale.

The second concern arises in relation to the water planning provisions relating to adaptive management, which provide exceptions to the no compensation rule. No compensation will be paid for changes to water entitlements except where provided for by regulation and where a WS Plan alters licence entitlements. The no compensation rule is, therefore, subject to political intervention that can make adaptive management through licence amendment too costly. Although the no compensation rule is directly in line with the Canadian approach to regulation, the influence of United States "takings" jurisprudence creates political momentum that challenges the ability of provincial governments to restrict the use of an entitlement through regulation when ecological conditions change.

The third concern is that the *WSA* relies on the same provincial apparatus of making orders and evaluating licence applications as the primary water management activities. Unfortunately, it is clear that this provincial administration is showing signs of weakness, as described in several Environmental Appeal Board decisions in the past five years.[291] Absent new resources and watershed-specific governance structures, continued reliance on this administrative structure will likely result in the failure of the new law. This is particularly concerning when watershed-specific hydrological conditions require rapid and short-term action, and there is a critical need to develop credible and defensible data on hydrological regimes across the province.

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[291] See e.g. *Fulford Creek Holdings Ltd and Gauthier v Assistant Regional Water Manager* (2010) WAT 009(a) & 2010 WAT 010(a) (British Columbia Environmental Appeal Board) (which had five years between beneficial use declaration and enforcement in an over-allocated stream); *Sanders v Assistant Regional Water Manager* (2009) WAT 002(a) (British Columbia Environmental Appeal Board) (where the Board accepted the applicant's water flow data over those of the Ministry); and *Helmer v Assistant Regional Water Manager* (2009) WAT 017(a) (British Columbia Environmental Appeal Board) (which showed a cooperative effort to solve serious issues).

Finally, this new water management regime does not acknowledge or provide a process for quantifying Aboriginal rights related to water. While there is not yet a specific case in Canada that forces a recognition of a direct Aboriginal right to a specified volume of water, it is difficult to conceive of ecological adaptation in colonial water law when the entitlements of a senior level of government—First Nations—are not recognized and their interests are not quantified under the management regime. While the potential scope of water sustainability WS Plans may offer opportunities to negotiate Aboriginal water rights as part of a watershed-based agreement, local politics may just as likely impede specific recognition. In short, while BC has made significant progress on reforming its outdated water law regime, there are still basic questions about its ability to implement effective adaptive management that the NSW process has dealt with by using multiple layers of jurisdiction and iterative water planning.

5. CONCLUDING THOUGHTS: COMPARING THE ADAPTIVE MANAGEMENT APPROACHES IN NSW AND BC'S WATER LAW REFORM INITIATIVES

The jurisdictions of NSW and BC are both in the process of reforming their water law regimes to explicitly incorporate adaptive management. While NSW commenced the process much earlier than BC, the water reforms in each jurisdiction aim to do the same thing—resolve conflicts between water users and, most importantly, between water users and environmental flows to provide for the use of water while maintaining the health of surface and groundwater systems. Given the lack of stationarity in hydrological conditions, as amplified by climate change, this objective can only be achieved when adaptive management is built into the regime to accommodate ecosystem-based management principles.

To varying degrees, the water reforms in both NSW and the BC achieve this. Each provides for the integration of decision-making, protection of environmental flows, and mechanisms to adjust water entitlements to accommodative changes in the water resource. However, despite their largely similar colonial legislative origins, there are some significant differences in approach.

Both the NSW and BC water reforms provide for hydrological integration, with the licensing of groundwater occurring in NSW since the early 1900s and much more recently in BC. A key difference, however, is the role that water planning plays in guiding water management in these two jurisdictions. The NSW legislation mandates the preparation of detailed plans for all surface and groundwater resources in the state to direct water entitlement allocation decisions, specify the available consumptive pool, and direct the management of the water resource to which the plan applies. The plans address, where relevant, the connectivity across catchments and between surface water and groundwater aquifers providing a mechanism to integrate management decisions. The *Commonwealth Water Act* 2007 (Cth) adds another layer of mandatory planning requirements for water resources within the MDB, to further align the trans-boundary management of the Basin water resources. The BC *WSA* also makes provision for statutory water plans, however these plans are to be prepared on order of the Minister in specified circumstances. The purpose and content of each plan may also vary, as the statutory provisions enabling planning are enabling and not mandatory. At least from the outset, the *WSA* does not contemplate a comprehensive system of statutory water plans for all water resources in the province. In both NSW and BC, once in place, however, the plans

direct decision making and the exercise of rights associated with a water entitlements to which the plan applies, with the BC plans having the potential to affect land use planning decisions.

The water reforms in both NSW and BC have resulted in protections for environmental flows. The NSW *Water Management Act* 2000 (NSW) delivers this protection in two ways. First, the mandatory water plans must commit water to the environment, referred to as planned environmental water, and environmental rules within the plan must provide for the identification, establishment and maintenance of this water. From 2019, the long-term average SDLs set by the Basin Plan for water resources within the MDB will also need to be incorporated into mandatory plans. Detailed monitoring and assessment processes guide the setting of these limits and setting aside of planned environmental water, which in turn determine the water available in the particular resource for consumptive purposes. BC takes a different approach with decision makers required to consider environmental flow needs when evaluating water licence applications. While these considerations will also be based on hydrological assessments, at least initially the decision will be made on an application-by-application basis, rather than through a cohesive planning system. Considerable reliance will be placed on location and season-specific orders restricting water diversions when low flows arise rather than predicting low flows and allocating available consumptive water with that in mind, as is the approach in NSW. Together with environmental or conservation water held under licence, something which both NSW and BC's reformed water legislation allows, the reserving of water for environmental flows should leave more water for catchments and aquifers. However, this alone will not necessarily maximize environmental outcomes. Recognizing this, the environmental watering plan regime under the *Water Act* 2007 (Cth), takes a further and important step towards maximizing outcomes by coordinating the management and release of existing and future environmental water into the system. There is nothing equivalent to an environmental watering plan in the BC water legislation.

Finally, the reformed water regimes in both NSW and BC each provide flexibility through mechanisms that allow changes to the volumetric allocation of water under a water entitlement. Pursuant to the *WSA*, volumetric licences issued under the *WSA* are now subject to review and amendment, albeit only 30 years after the *WSA* comes into force. This represents a significant change in approach for BC, which historically sought to provide licensees with security to take a specified amount of water with a view to enabling licensees to rely on that entitlement. On the other hand, NSW had already allowed for conditions to attach to licences issued under the *Water Act* 1912 (NSW) to amend allocation entitlement since the mid 1980s. The *Water Management Act* 2000 (NSW), however, took a different approach. Under this regime, secure, perpetual and tradeable rights to water are created in order to facilitate the development of a national water market. These water rights, in the form of water access entitlements, provide for a secure right to a share of the fluctuating consumptive pool in a specified water resource rather than to a volume of water. This allows the flexibility to change the allocation to the consumptive pool without amending the water access entitlement.

While desirable from an adaptive management perspective, the resulting flexibility may impose a cost to the holder of a water entitlement—specifically a reduced access to water. Under the *WSA*, that cost may be born directly by the water licensee, with no compensation payable under the *WSA,* unless specified by WS Plan or regulation. At least in theory—but unlikely politically—the BC Provincial government can reduce water entitlements in a watershed

without concern for the budgetary consequences. The NSW legislation, on the other hand, allocates the costs associated with this flexibility between water access entitlement holders and the state. Reductions in the available consumptive pool, and therefore the volumetric share, due to seasonal or long-term climatic variation in the water resource are not compensated. However, compensation is owed under the NSW legislation when the state reduces the consumptive pool to accommodate a change in government policy or provision of additional water to the environment. In this way, the cost of adaptive management, particularly the cost of responding to changing scientific information relating to the environmental needs of water dependent ecosystems, is shared with the state. In the short term, the NSW and Commonwealth governments have invested heavily in the transition to a more sustainable water regime, with the Commonwealth alone committing over $13 billion to purchase water entitlements and fund infrastructure efficiencies to reduce the consumptive load on water resources within the MDB.[292] While BC's transition appears comparatively much cheaper, as noted above, given the 30 year time lag associated with amending licences, perhaps the truly difficult political decisions relating to compensation have simply been deferred.

Despite the shortcomings of each jurisdiction's law reform choices evaluated in this paper, these two comparable legal regimes are of international importance. They both introduce new and evolving ecological baselines into existing water management approaches. They also attempt to provide for transparent and fair adaptive management measures that give notice to licensees of potential changes through planning processes and long-term licence review. In the context of changing hydrology globally, many national and sub-national governments will be undertaking similar reforms over the next few decades and can look to the experiences in NSW and BC to perfect their own law reform approaches.

[292] See, Australia, Department of the Environment, *Infrastructure Investment in the Murray-Darling Basin* (2015), online <www.environment.gov.au/system/files/resources/40d2b733-9c54-4521-8f29-d6138c65def3/files/infrastrucuture-investment-murray-darling-basin-factsheet.pdf>. Of the $13 billion, $3.2 billion is committed to the purchase of water entitlements. See also Australia, Department of the Environment, Water, Heritage and the Arts, *Restoring the Balance in the Murray-Darling Basin* (May 2010), online: <www.environment.gov.au/system/files/resources/7151bc44-2dff-4921-a7e6-4cb797f3b341/files/restoring-balance.pdf>.