Regulating Nonpoint Source Pollution in the US: A Regulatory Theory Approach to Lessons and Research Paths for Australia

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1. INTRODUCTION

Water pollution from diffuse (nonpoint) sources is the unfinished business of water quality regulation in Australia[1] – one which has been recognised at the Australian national level since at least 1994 as having a major impact on water quality.[2] Nonpoint pollution does not come from a pipe, or other discrete and significant point. Rather, it comes from nonpoint sources such as nutrients percolating through farmland into groundwater, or from numerous and dispersed small point sources, such as urban stormwater drains.[3] The problem of nonpoint water pollution remains after the low-hanging fruit of major point source discharges have been picked, metaphorically, by traditional command-and-control regulation based on discharge permits.[4] By its nature, nonpoint pollution poses unique problems with which Australian regulations and institutions continue to struggle. It is often difficult, economically and technically, to use end-of-pipe control devices; it is difficult to monitor the many and various individual discharges; its impacts are confusingly affected by exogenous weather conditions; and its sources are sometimes politically untouchable.[5]

Australia has recently experienced a relative policy lull in relation to water quality, particularly after the demise in 2008 of the National Action Plan for Salinity and Water Quality, and as reforms concentrating on water quantity have increased to storm-like intensity. However, the water quality components of the federal Water Act 2007 (Cth) ('Water Act') and the breaking of a decade-long drought[6] could well signal a national-level change.

This paper seeks to infuse coming debates about controlling nonpoint pollution in Australia with inspiration, and caution, derived from US experience, interpreted in the light of regulatory theory. Australia and the US share many characteristics that are relevant to nonpoint pollution. Firstly, nonpoint sources are key contributors to the pollution of surface water and groundwater in both jurisdictions. In nearly every major US watershed, nonpoint sources generate the most serious pollution

1. N Campbell, B D'Arcy, A Frost, V Novotny & A Sansom, *Diffuse Pollution: An Introduction to the Problems and Solutions* (London: IWA Publishing, 2004) 1.
2. Agriculture and Resource Management Council of Australia and New Zealand ('ARMCANZ') and Australian and New Zealand Environment and Conservation Council ('ANZECC'), *National Water Quality Management Strategy: Policies and Principles – A Reference Document* (1994) 21.
3. Campbell et al, above n 1, 2. Note that this paper uses the terms 'nonpoint' and 'diffuse' interchangeably to encompass both pollution from nonpoint sources and also that from dispersed, small point sources: 7. This is because the term 'diffuse pollution' is rarely used in the US, the key jurisdiction under study.
4. Ibid 1.
5. C Dosi & T Tomasi, *Nonpoint Source Pollution Regulation: Issues and Analysis* (Dordrecht: Kluwer Academic, 1994) x–xiii.
6. MD Young, 'Non-Point Pollution Control: Experience and Observations from Australia' in J Albiac & A Dinar (eds), *The Management of Water Quality and Irrigation Technologies* (Oxford: Earthscan, 2009) 102, 103.

problems.[7] In Australia, nonpoint sources contribute the vast majority of nutrients to inland waters, and turbidity, contributing to eutrophication and algal blooms.[8] Secondly, federalism concerns are similar in both nations. As in Australia, US states and localities are primarily responsible for land use regulation. Accordingly, the link between nonpoint pollution and land use leads to strong federal reluctance to regulate nonpoint sources aggressively.[9] Thirdly, in both Australia and the US, voluntary approaches to dealing with nonpoint source pollution are traditionally preferred. Such approaches are not only considered practical for under-staffed and under-resourced agencies; they also avoid political confrontations with powerful large polluters.[10]

The US has at least partially overcome challenges to rigorous and widespread controls on nonpoint pollution. It was the first country officially to address nonpoint pollution.[11] Almost 25 years of restrained federal intervention has overseen, driven and encouraged states to implement nonpoint source controls.[12] In the eyes of Congress, this has established a vast 'laboratory for new institutional control mechanisms for vexing nonpoint source problems' as states and localities experiment with implementation.[13] Australia can benefit from considering the successes and the failures produced in this long-running laboratory. Two decades of emphasising 'enforceable mechanisms' are beginning to turn around the traditional US reliance on voluntary control methods, in ways that Australia could also do well to keep in view.

This exploratory study seeks to highlight selected issues, regulatory approaches and case study areas that offer promising avenues for further research to respond to nonpoint pollution in Australia. It does not attempt to offer a representative description of nonpoint source controls in the US, but rather to identify future research paths. The following elements are targets for investigation: mechanisms for goal-setting, monitoring and reporting, management planning, and responses to nonpoint pollution in the context of both land and water use. Each of these elements is affected by the unique problems posed by nonpoint pollution – the

7. RV Percival, *Environmental Regulation Law, Science and Policy* (Alphen: Wolters Kluwer, 2009) 641. Note that the focus of this study is ambient water quality, rather than concerns relating to a particular end use, for example drinking water. Additional legislation, not covered in this study, is also relevant to specialised end uses such as drinking water.
8. J Ball, 'Water Quality and Sources of Pollution' in *Inland Waters Theme Report,* Australia State of the Environment Report (2001) Pt 3, 55–60.
9. RK Craig, 'Local or National? The Increasing Federalization of Nonpoint Source Pollution Regulation' (2000) 15 *Journal of Environmental Law and Litigation* 179, 182.
10. WL Andreen, 'The Evolution of Water Pollution Control in the United States – State, Local and Federal Efforts, 1789–1972: Part 1' (2003) 22 *Stanford Environmental Law Journal* 145, 155.
11. Dosi & Tomasi, above n 5, x.
12. LK Breggin, JM McElfish, J Pendergrass & S Bass, 'Inventing Nonpoint Controls: Methods, Metrics and Results' (2006) 17 *Villanova Environmental Law Journal* 87, 158–9.
13. Craig, above n 9, 231 (citing US Senate Report No 95-370, 10, reprinted in 1977 US Code Congressional and Administrative News 4326, 4336).

difficulties of information collection, politics, preventive control, and exogenous effects.

Before setting out the structure of the paper – a brief word on approach. US institutional and regulatory responses are described on two structural levels. At the lower level, the article describes regulations and institutions created to deal with nonpoint pollution problems in specific geographic areas. At the higher level, it describes the superstructure of intergovernmental relations – that is, the balance and operation of federal-state power – which drives the lower-level arrangements. This latter element is not necessarily set out to promote a greater federal role in Australia, though the discussion does set out several possible models for doing so. Rather, it is presented because it forms an indispensable part of the US landscape of nonpoint pollution control, and because it also usefully demonstrates variations on a two-tier system that are equally relevant to considering state-local relations.

Part 2 provides theoretical and policy background information on nonpoint pollution in Australia and the US. It sets out a system for categorising approaches to controlling nonpoint pollution, which is used to focus the study of US approaches. It also describes the fabric of federal and state approaches to nonpoint pollution in Australia, and the gaps and weak points in this fabric, to which the US examples are directed.

Part 3 provides an overview and in-depth discussion of how the main US federal law for water quality, the Clean Water Act,[14] deals with nonpoint sources and encourages states to do so: firstly, by setting water quality goals (Total Maximum Daily Loads, or 'TMDLs') and implementing programs to meet them; secondly, by providing for state planning processes (nonpoint source management programs); and thirdly, by establishing collaborative governance arrangements for controlling nonpoint sources which threaten nationally significant estuaries (the National Estuary Program). These elements are illustrated by case study examples of implementation, chosen because they: occupy gaps or weak points in the Australian experience in relation to regulatory approaches; include particularly innovative components; and add to existing scholarship on well-known programs for dealing with nonpoint pollution.[15] Part 4 discusses the Coastal Zone Management Act,[16] a more narrowly applicable, but in many ways more progressive, federal law dealing with nonpoint pollution.

14. 33 USC §1251 (1972).
15. See, eg, case studies of managing the Chesapeake Bay, the Great Lakes, the Sacramento-San Joaquin River Delta and Florida Everglades: BC Karkkainen, 'Collaborative Ecosystem Governance: Scale, Complexity and Dynamism' (2002) 21 *Virginia Environmental Law Journal* 189; J Freeman & DA Farber, 'Incrementalism and the Administrative State: Modular Environmental Regulation' (2005) 54 *Duke Law Journal* 795; AK Gerlak & T Heikkila, 'Comparing Collaborative Mechanisms in Large-Scale Ecosystem Governance' (2006) 46 *Natural Resources Journal* 657.
16. 16 SUSC §§1451–1464 (1972).

Complementing the paper's major focus on federal laws and their state implementation, Part 5 discusses a notable state law approach to controlling nonpoint sources: the Porter-Cologne Water Quality Control Act in California. Since it is beyond the scope of this paper to give a comprehensive view of state laws for controlling nonpoint pollution,[17] the Californian approach was selected to demonstrate an unusually rigorous approach, which responds to important nonpoint challenges.

Finally, Part 6 recaps the US approaches and examples and distils, in a preliminary way, the factors that seem at face value to characterise successful and promising approaches, the elements of which therefore deserve further research, as well as aspects which regulatory theory (particularly experimentalist governance) suggests could be improved. It also analyses key variables present in different US approaches to the dominant style of management-based regulation, and suggests paths for further research.

2. BACKGROUND

2.1 Categorising approaches to controlling nonpoint pollution

This study advances a typology of categories for regulatory tools used to address nonpoint pollution, informed by regulatory theory. This typology is used to indicate gaps and weaknesses in the Australian approach, and to focus the US study on these areas. It is an adapted and simplified version of Gunningham and Sinclair's two-part typology, informed also by work by Coglianese and Lazer.[18]

The first part of the typology examines the mechanism for inducing compliance. Broadly, these are: education, information measures, and other voluntary instruments; economic instruments such as monetary penalties, subsidies or property rights; self-regulation by industry bodies, for example using binding codes of practice;[19] legally binding regulatory instruments; and planning

17. This task is made particularly difficult by the large number of states and the apparent lack of any recent synthesizing work on this issue. The most recent such reports referenced by the US EPA date from the late 1990s: JM McElfish, *Almanac of Enforceable State Laws to Control Nonpoint Source Water Pollution* (Environmental Law Institute, 1998); JM McElfish, *Enforceable State Mechanisms for the Control of Nonpoint Source Water Pollution* (Environmental Law Institute, 1997); JM McElfish, *Putting the Pieces Together State Nonpoint Source Enforceable Mechanisms in Context* (Environmental Law Institute, 2000).

18. N Gunningham & D Sinclair, 'Policy Instrument Choice and Diffuse Source Pollution' (2005) 17 *Journal of Environmental Law* 51; C Coglianese & D Lazer, 'Management-Based Regulation: Prescribing Private Management to Achieve Public Goals' (2003) 37 *Law and Society Review* 691. For a notable alternative method for categorising responses to diffuse pollution, see BM Dowd, D Press & M Los Huertos, 'Agricultural Nonpoint Source Water Pollution Policy: The Case of California's Central Coast' (2008) 128 *Agriculture, Ecosystems and Environment* 151, 152–5.

19. The term self-regulation is noted to have 'multiple meanings, no one of them being authoritative': A Freiberg, *The Tools of Regulation* (Sydney: Federation Press, 2010) 26, citing T Daintith, 'Regulation' in T Daintith, R David, RM Buxbaum & F Mádl, *International Encyclopedia*

instruments.[20] The second part pinpoints the type of standard involved in the tool. Standards may require an entity to use certain decision-making or planning processes (a management standard), require it to adopt a particular design or method for undertaking an activity (a design standard), or limit its level of pollution, without specifying a particular method (a performance standard).[21] Another way of thinking about this component is that each type of standard addresses a different stage of an activity. Management standards apply to planning, design standards apply to acting, and performance standards apply to pollution outputs.[22] In some cases, a particular tool reflects characteristics of more than one of these categories. This system is first used, in the next section, to characterise general weaknesses and gaps in Australia's responses to nonpoint pollution.

It is important to note that the programs discussed here are capable of analysis using multiple theoretical perspectives. They include: New Public Management, with its emphasis on organisational performance using standards and measures, disaggregated management units, and market mechanisms;[23] Third Way politics, which argues for a balance between the market, government and civil society;[24] New Governance, which focuses on involving multiple levels of government, and collaborating with industry and community organisations;[25] democratic experimentalism, which draws attention to pooling information, decentralisation and citizen participation;[26] and more recently, the more general notion of New Environmental Governance.[27] This article draws from, and attempts to identify

of Comparative Law (Mohr Siebeck, 1997). Note that self-regulation, as used in this article, refers to *legally binding* arrangements of an organisation, used to regulate the behaviour of its members. This contrasts with what might be called 'self-encouragement', whereby an organisation encourages its members to adopt certain behaviours, and no consequences flow from failing to do so.

20. Gunningham & Sinclair, above n 18, 53–4.
21. Ibid 54–5.
22. Coglianese & Lazer, above n 18, 694.
23. D Osborne & T Gaebler, *Reinventing Government: How the Entrepreneurial Spirit Is Transforming the Public Sector* (Melbourne: Plume, 1993); R Pires, 'Governing Regulatory Discretion: Innovation, Performance and Accountability in Two Models of Labor Inspection Work' (Paper presented at ILO *Regulating for Decent Work: Innovative Labour Regulation in a Turbulent World*, Geneva, 8–10 Jul 2009) 5–6.
24. A Giddens, *The Third Way and its Critics* (Cambridge: Polity Press, 2000); SA Moore, 'Regional Delivery of Natural Resource Management in Australia: Is It Democratic and Does It Matter?' in R Eversole & J Martin (eds), *Participation and Governance in Regional Development* (Hampshire: Ashgate Publishing, 2005) 121.
25. BW Head, 'From Government to Governance: Explaining and Assessing New Approaches to NRM', in M Lane, C Robinson & B Taylor (eds), *Contested Country: Local and Regional Natural Resource Management in Australia* (Melbourne: CSIRO Publishing, 2009) 15, 16–17
26. MC Dort & CF Sabel, 'A Constitution of Democratic Experimentalism' (1998) 98 *Columbia Law Review* 267.
27. C Holley, 'Facilitating Monitoring, Subverting Self-Interest and Limiting Discretion: Learning from 'New' Forms of Accountability in Practice' (2010) 35 *Columbia Journal of Environmental Law* 127, 132–7. This approach emphasises broad principles of 'a focus on the virtues of flexibility, contextual and 'bottom-up' governance, collaboration, learning and adaptation, and 'new' forms of accountability': at 131–2.

issues that are important to, multiple schools of regulatory theory. This somewhat agnostic – or perhaps polytheistic – approach follows scholars who emphasise the value of case-by-case analysis,[28] and is in keeping with the article's modest aim of identifying promising paths for comparative research.[29]

2.2 The federal and state policy context in Australia

Before exploring US approaches to nonpoint pollution, it is necessary to give a general overview of how Australian jurisdictions deal with the problem. This accomplishes two related goals. It weaves the fabric of present Australian approaches to nonpoint pollution, making obvious its gaps and weak places – points at which it is instructive to look abroad for inspiration. It also sets the stage against which readers should appraise the applicability of the US examples. In this regard, Australia's historical division of labour in relation to water quality, its history of dealing with nonpoint pollution, its recent strong regulatory emphasis on ecological aspects of water management, and the recently heightened federal role in the area are all crucial contextual factors.

In Australia, as in the US, the primary responsibility for regulating water quality lies, as a constitutional matter, with the states rather than with the Federal Government. Nonetheless, the Australian Government has worked with the states and territories over more than a decade to establish and fund regional institutional arrangements to improve water quality. This cooperation has produced large, truly nation-wide programs such as the Natural Heritage Trust ('NHT'), which operated in two phases from 1997 to 2008, and which included the National Action Plan for Salinity and Water Quality, from 2000 to 2008 ('NAP'); and Caring for Our Country, from 2008 onwards; and more specific cooperation and investment frameworks, such as the National Cooperative Approach to Integrated Coastal Zone Management.[30]

The NHT provided a framework for national-, regional-, and local-scale investment in environmental activities, under federal-state cooperative arrangements. During its second phase, the NHT sought to invest A$350 million in measures to improve

28. JSF Wright & B Head, 'Reconsidering Regulation and Governance Theory: A Learning Approach' (2009) 31 *Law and Policy* 192, 193 (interpreting JB Opschoor & K Turner, *Economic Incentives and Environmental Policies. Principles and Practice* (Dordrecht: Kluwer, 1994) 34; PJ May, 'Compliance Motivations: Perspectives of Farmers, Homebuilders and Marine Facilities' (2005) 27 *Law and Policy* 317, 340.
29. This article focuses on the parallels between the US and Australian experiences; the regulation of nonpoint water pollution in the EU operates within a broadly similar framework of issues, and offers a further useful comparison point, albeit one which falls outside the scope of the present work. See generally, P Chave, *The EU Water Framework Directive An Introduction* (London: IWA Publishing, 2001).
30. Natural Resource Management Ministerial Council, *National Cooperative Approach to Integrated Coastal Zone Management Framework and Implementation Plan* (Canberra: Commonwealth of Australia, 2006).

water quality; the NAP was its first major investment program.[31] The NAP involved setting water quality targets at the regional level, providing standards and funding for accredited regional natural resource management ('NRM') plans for 21 priority catchments, undertaking capacity-building efforts and a public communication program for communities and landholders, and engaging in land clearing- and water-related regulatory reforms.[32] Much of the policy buzz of the NAP – and, for that matter, policy elsewhere – was on developing market-based instruments to deal with water pollution. The NAP's Market-Based Instruments Pilots Programme investigated 11 such mechanisms, including encouraging good land management through 'conservation insurance', auction processes, cap-and-trade systems, new finance systems, and tax incentives.[33] However, the transition from developing pilots to widely implementing market-based measures in practice is yet to occur, at least in the case of nonpoint pollution. The NAP and NHT also led to continuing performance-based collaborative approaches using multi-stakeholder regional bodies, which formulate NRM plans; these plans cover water quality matters, among other things, and include specific measurable targets and indicators.[34]

In contrast to the broad focus of the NAP, Caring for Our Country focuses on water quality in 'critical aquatic habitats'. Specifically, it aims to reduce sediment and nutrient discharge from agricultural lands into the Great Barrier Reef lagoon, Ramsar sites, and 'priority coastal hotspots'.[35] It envisions doing this by improving agricultural land management practices, using stewardship arrangements, establishing riparian buffer zones, reducing and managing acid sulphate soils and salinity, and improving chemical use.[36] The outcomes of Caring for Our Country are assessed using the NRM Monitoring, Evaluation, Reporting and Improvement ('MERI') Framework, which focuses on the condition of priority biophysical, social and institutional assets.[37] In addition to Caring for Our Country, other

31. M Lane, B Taylor & C Robinson, 'Introduction: Contested County – Regional Natural Resource Management in Australia' in Lane, Robinson & Taylor, above n 25, 1, 5–7; Natural Resource Management Ministerial Council, *Framework for the Extension of the Natural Heritage Trust* (Natural Heritage Trust Archive, 2002).
32. See generally *Intergovernmental Agreement on a National Action Plan for Salinity and Water Quality between the Commonwealth of Australia, New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania, the Northern Territory, and the Australian Capital Territory* (2000).
33. Australian Government, *National Market-Based Instruments Pilot Programme*, National Action Plan for Salinity and Water Quality Archive. <http://www.napswq.gov.au/mbi>.
34. Holley, above n 27, 185–94.
35. Department of Agriculture, Fisheries and Forestry (Cth), *Caring for Our Country: Outcomes 2008–2013* (2008) 20.
36. Ibid 25, 27. Caring for Our Country also indirectly targets nonpoint water pollution by seeking to improve sustainable farm practices. In that context, it resuscitates (though to a notably lesser degree than in the NAP) the concept of market-based instruments, while also supporting stewardship, covenanting, and property management plan arrangements.
37. Australian Government, Department of Sustainability, Environment, Water, Population and Communities, *Monitoring, Evaluation, Reporting and Improvement for Caring for Our Country*, Caring for Our Country: Monitoring and Evaluation <http://www.nrm.gov.au/me>; see generally

cooperative federal-state arrangements target special areas, such as the Great Barrier Reef, for protection from nonpoint source pollution.[38]

The National Water Quality Management Strategy ('NWQMS') is a series of national guideline documents on water quality. At the level of general principle, it encourages controlling nonpoint sources through bottom-up catchment management, a 'best management practice' ('BMP') philosophy in urban runoff measures and rural land management (that is, design standards), education and market-based measures.[39] It does not focus, to any significant degree, on mandatory or enforceable approaches. Individual guideline documents of the NWQMS deal with specific nonpoint pollution sources, namely rural land uses, urban stormwater management, and sewerage systems.[40]

Applying the NWQMS, Water Quality Improvement Plans are non-statutory management plans produced collaboratively by the Federal Government working with a state, to guide investment for reducing nonpoint pollution in a small number of high value marine and estuarine areas. The plans are designed to bring together a wide range of stakeholders. They may include, among other things, monitoring, decision support systems, BMPs for agriculture, and possibly market-based instruments.[41]

Overshadowing these policies at the federal level is the Water Act, which pushes forward the Commonwealth's involvement in water quality matters to a significant degree. The Water Act requires the Murray-Darling Basin Authority ('MDB Authority'), an independent federal agency primarily charged with dealing with water quantity matters, to enter the water quality field in important ways. The MDB Authority sets objectives and targets at a large geographic scale, through a Basin Plan,[42] and requires states to set them at a smaller scale, through water

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Australian Government, *Australian Government Natural Resource Management Monitoring, Evaluation, Reporting and Improvement Framework* (Australian Government, 2009).

38. See, eg, Australian Government and Queensland Government, *Reef Water Quality Protection Plan 2009 for the Great Barrier Reef World Heritage Area and Adjacent Catchments* (Reef Water Quality Protection Plan Secretariat, 2009).
39. ARMCANZ and ANZECC, above n 2, 17, 21–3, 26–8.
40. See Australian Government, *National Water Quality Management Strategy*, Water for the Future Policies and Programs <http://www.environment.gov.au/water/policy-programs/nwqms/>.
41. Australian Government, *Water Quality Improvement Plans* <http://www.environment.gov.au/water/policy-programs/nwqms/wqip>.
42. The MDB Authority must develop 'management objectives and outcomes' in relation to water quality and salinity to be achieved by the Basin Plan, a legally binding plan for the ecologically sustainable management of the water resources of the Murray-Darling Basin: Water Act 2007 (Cth) s 22(1) item 4(b). It must also develop a water quality and salinity management plan to be subject to 5-yearly reviews, and to be included in the Basin Plan: at s 22(1) items 10 and 13(a). That plan must identify the key causes of water quality degradation in the Murray-Darling Basin, and include water quality and salinity objectives and targets for the Basin water resources: s 25. The Basin Plan must also 'specify water quality trigger points and salinity trigger points at which water in the River Murray System becomes unsuitable for meeting critical human water

resource plans.[43] It sets monitoring arrangements for water quality,[44] researches water quality matters and advises the states in relation to actions that may affect water quality.[45] These roles are substantially weakened, however, by a prohibition on 'directly' regulating land use, land use planning, and pollution control.[46] This seems to prevent the MDB Authority from imposing land-focused management, design or performance standards. More indirectly, the MDB Authority sets 'long-term average sustainable diversion limits' that will cap the diversion of water in each water resource plan area; these must be set so as not to compromise water quality.[47] A strong ecological focus permeates these roles.[48]

At the federal level, then, it is apparent that the government is claiming a greater role in relation to water quality, at least in terms of goal-setting, if not through regulatory instruments or measures connected with land use. The policy superstructure, long based on state primacy in this area – though admittedly with guidance and financial support from federal-state cooperative investment arrangements – shows at least some signs of change within Australia's most important river basin. Simultaneously, the Federal Government has narrowed the focus of its flagship incentive programs for nonpoint pollution to high conservation value areas, which also omit any focus on mandatory or enforceable measures. The NAP's pilot programs using market-based approaches, such as cap-and-trade systems, have not become widespread and appear not to have engaged continuing policy attention, at least in relation to nonpoint pollution.

At the state level, jurisdictions use both large-scale and targeted approaches to deal with nonpoint pollution. Similar to NHT investment programs, states have established large-scale programs for region-based investment in NRM, including water quality issues.[49] Some states, for example South Australia, impose a general statutory duty not to pollute the environment,[50] supported by design standards in the form of codes of conduct for nonpoint sources that are intended to guide

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needs'; if these points are exceeded, intergovernmental emergency response procedures are set in motion: ss 86B(1)(c), 86F.

43. The Basin Plan must include requirements in relation to 'water quality and salinity objectives' for designated water resource plan areas: ibid s 22(3)(f).
44. The Basin Plan must include arrangements for monitoring water quality: ibid s 86C(1)(a).
45. Ibid. ss 172(1)(b), (1)(d)(ii), (1)(g); Sch 1 cll 43(1)(b), (d), 45(c), s 48 (water quality objectives), s 49 (proposals that may significantly affect water quality), s 98(4) (operating storages having regard to water quality), s 133(3)(b) (special water distribution arrangements triggered by low water quality), sch B (Basin Salinity Management).
46. Ibid s 22(10).
47. Ibid s 4(1) (environmentally sustainable level of take), s 22(1) item 6, 23 (environmental outcomes).
48. See, eg, ibid s 21(2), (3) (in relation to preparing the Basin Plan).
49. See, eg, Natural Resources Commission, *Review of Catchment Action NSW Funding Allocations to Catchment Management Authorities,* Final Report (Oct 2010); Queensland Government, *Q2 Coasts and Country* (15 Feb 2011).
50. See, eg, Environment Protection Act 1993 (SA) s 25(1).

compliance with that duty.[51] Similarly, Victoria requires activities that have the potential to cause nonpoint pollution to be managed consistently with best practice.[52] It is not clear, however, that these requirements are rigorously enforced in relation to nonpoint sources. A common and probably more workable approach used over large geographic scales is to give land use decision-makers more guidance by requiring them to consider the beneficial uses of water when making decisions about planning schemes and developments – a management standard. The Victorian Neighbourhood Environment Improvement Plan adopts elements of both management and also performance standards, and applies at a smaller scale. This voluntary statutory program encourages groups of stakeholders, with a government 'sponsor', to develop plans of action to address complex environmental problems, including nonpoint water pollution.[53] Empirically, vague targets and a lack of monitoring mechanisms raise questions about the program's effectiveness.[54]

In addition to general environmental tools, which can be used to address nonpoint pollution as well as other issues, the states adopt approaches that are more targeted to nonpoint pollution and particular land uses. New South Wales' non-statutory diffuse pollution policy uses a design standard approach, applying voluntary and economic instruments to promote BMP guidelines and deliver incentives to landholders in pollution hotspots to undertake BMPs.[55] Other targeted components of the policy include educating farmers, establishing demonstration sites for riparian zone management, including nonpoint pollution issues in property management planning, and developing market-based instruments,[56] though the latter seem more theoretical than implemented at present. In Queensland, land management agreements in relation to leased land and conditions on land leases may also be used to address declining water quality.[57] Under recent legislation, certain farming properties must have state-approved property management plans to reduce nonpoint pollution flowing to the Great Barrier Reef.[58] In Western Australia, pastoral lessees must use 'methods of best pastoral and environmental

51. See, eg, J Botting & K Bellette, *Stormwater Pollution Prevention Code of Practice for Local, State and Federal Government* (Environment Protection Authority SA ('EPA SA'), 1998); J Botting & Assoc & K Bellette, *Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry* (EPA SA, 1999); K Bellette & A Ockenden, *Stormwater Pollution Prevention Code of Practice for the Community* (EPA SA, 1997).
52. 'State Environment Protection Policy – Groundwaters of Victoria', *Victoria Government Gazette* No S160 (17 Dec 1997) as varied by No G12 (19 Mar 2002) cl 24; 'State Environment Protection Policy – Waters of Victoria', *Victoria Government Gazette* No S107 (3 Jun 2003) cll 46, 50, 51, 55, 56.
53. Holley, above n 27, 173–8.
54. Ibid 178–85.
55. See, eg, *NSW Diffuse Source Water Pollution Strategy* (Sydney: Department of Environment and Climate Change ('DECC'), 2009) 25–6.
56. Ibid 22–5.
57. Land Act 1994 (Qld) ss 159(1)(f), 167(1)(f), 176U-176X, sch 6(j) 'land degradation' (j).
58. Great Barrier Reef Protection Amendment Act 2009 (Qld) Pt 2.

management practice';[59] this obligation is supported by a series of best management practice guidelines, which include water matters, but no incentives are offered, and only around 20 percent of pastoralists are estimated to use them.[60]

The Western Australian town of Busselton is home to a rare example of a loosely market-based approach to water quality management, involving nonpoint sources. The town obtained a permit to increase wastewater discharges to a closed bay suffering from excessive nutrient loads, by pursuing a partnership with local farmers to cost-effectively reduce the nutrient loads coming from rural catchments. The scheme used financial incentives and technical assistance for farm improvements, but did not involve formal trading between the point and nonpoint sources.[61]

Self-regulatory approaches that include a legally binding element[62] are also few and far between; voluntary approaches are more common. A well-known and comprehensive example of the latter is Cotton Australia's Best Management Practices, which cover water quality, among other things. Cotton farmers volunteer to be part of a farm management certification system, which involves an auditing process.[63] Such voluntary industry codes of practice may link with legislation, under provisions that enable landholders to demonstrate that they are discharging a general duty of care by performing practices set out in an accepted code of practice.[64]

At the state level, then, voluntary instruments are very popular, and mandatory measures are relatively common, though questions arise as to their enforcement. Enforcing these mandatory measures is doubtless a difficult task in the absence of a monitoring and reporting scheme, or other arrangements for ensuring that individual sources are accountable.

Before delving into US approaches, a broad, generalised summary of Australian tools is now presented, with the typology set out in Part 2.1 in mind. Voluntary and planning instrument-type measures represent the strongest approaches to inducing compliance, forming the fabric of nonpoint pollution policy in Australia. Market-based and readily enforceable regulatory instruments appear much weaker, and binding self-regulatory measures for dealing with nonpoint pollution are largely absent – an apparent gap in the fabric of Australian nonpoint pollution policy. In relation to standards, it appears that all types are used, to some degree. Design standards, for example, appear as BMP-based approaches. Performance

59. Land Administration Act (WA) s 108(2).
60. L Hunt, *Industry Guidelines for Sustainability in the Rangelands: Current Best Practice Management* (Melbourne: CSIRO Publishing, 2003) 64–5.
61. Young, above n 6, 109–11; L McGuire, L Newman & R Humphries, *Busselton Environmental Improvement Initiative,* Final Report (Water Corporation, 2007). Compare the Minnesota River Basin program, discussed below Part 3 2.
62. See above n 19.
63. Cotton Australia, *Growers' Toolkit: Best Management Practices* (2011).
64. Environmental Protection Act 1994 (Qld) ss 493A(5), 548.

standards coupled with design standards appear at the state level through statutory prohibitions on polluting the environment, supported by codes of conduct – albeit probably difficult ones to enforce in the nonpoint context. Management standards commonly apply, at a high level, to land use planners, agencies implementing NAP regional NRM plans, and the MDB Authority in formulating restrictions on water diversions, and, at a lower level, through property management plans.

Though this analysis is necessarily broad and simplified, it serves to focus the remainder of the paper on the apparent gaps and weaknesses surrounding regulatory instruments, market-based economic instruments, self-regulatory schemes, and performance standards. It has also served to highlight that, while the states clearly have primacy in regulating nonpoint pollution, the Federal Government is assuming an increased role. It has further shown a strong Australian emphasis on management-based approaches, ecological aspects, and community involvement.

3. CONTROLLING NONPOINT POLLUTION UNDER THE CLEAN WATER ACT

The Federal Government has a major role in regulating water pollution in the US, unlike in Australia. But it was not always so – before World War II, states and local governments were solely responsible for water pollution.[65] In 1948, Congress passed the first federal law to fund water quality control; by 1965, federal legislation required states to develop water quality standards.[66] Federal intervention was intended to remedy the 'almost total lack of enforcement' of then existing state-based water quality laws.[67] The primary current federal instrument for regulating water pollution, the Clean Water Act ('CWA'), preserves the states' roles in controlling water pollution, particularly in relation to nonpoint source pollution, but does not permit a state to adopt less stringent requirements for point source pollution than those in the CWA.[68]

The CWA also strongly influences states' responses to nonpoint pollution. On the one hand, it establishes the fundamental distinction between point and nonpoint sources that omits the latter from discharge permit requirements. On the other hand, the CWA has produced some notable successes in relation to nonpoint pollution, although its nonpoint source provisions undoubtedly have flaws. Similar to Australian approaches, the CWA strongly adopts a management-based approach by requiring states to set goals and implement management plans to meet them.

65. RL Glicksman & MR Batzel, 'Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark' (2010) 32 *Washington University Journal of Law and Policy* 99, 101.
66. Percival, above n 7, 643–4
67. Glicksman & Batzel, above n 65, 101.
68. Clean Water Act, 33 USC § 1370. The to-and-fro of constitutional case law surrounding the Federal Government's actions in the field is important to understanding federal-state dynamics of nonpoint pollution control in the US, but is beyond the scope of this paper. See Craig, above n 9, 204–18.

The CWA includes nonpoint sources in its goal-setting requirements, which has led some states to develop innovative schemes in pursuit of those goals, some of which this article describes. The CWA also requires states to develop plans for implementing BMPs and measures to control nonpoint pollution, a requirement that has produced several local regulatory successes. Finally, the CWA's focus on water pollution in nationally significant estuaries has produced effective, statute-based collaborative governance arrangements and a rare example of successful self-regulation in this area. Nonetheless, at a higher level, the CWA shies away from mandating state action, and fails to provide sufficient incentives to induce many states to take meaningful action. Though this regulatory superstructure is somewhat stronger than Australia's by virtue of its detailed statutory nature, it has produced fewer successes than required to effectively control nonpoint pollution at a large scale.

3.1 Point and nonpoint sources

The CWA generally operates by distinguishing point from nonpoint sources of pollution. Most importantly, it prohibits the addition of any pollutant to navigable waters – construed very widely to cover most surface waters – from any point source without a permit.[69] Point sources require a permit under the National Pollutant Discharge Elimination System ('NPDES'), which is administered either by the federal Environmental Protection Agency ('EPA') or by state agencies under delegated authority.[70] A permit applies technology-based requirements, known as effluent limitations, which are nationally standardised by industry. Additional restrictions, known as water quality related effluent limitations, are applied if this is necessary to meet water quality goals for the relevant water body.[71] This has important ramifications for controlling nonpoint sources – about which more later.

Point sources under the CWA are:

> any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.[72]

Accordingly, such sources of pollution as agricultural runoff, sediment from forestry, or erosion from road surfaces do not need a NPDES permit. However,

69. Ibid. Courts have construed the term 'navigable waters' very expansively, so that the prohibition now applies to nearly all surface waters of the US. However, precisely defining these jurisdictional limits is still contentious. For a recent discussion, see JJ Janisch, 'Scope of Federal Jurisdiction under Section 404 of the Clean Water Act: Rethinking "Navigable Waters" After *Rapanos v United States*' (2007) 11 *University of Denver Water Law Review* 91, 100.
70. CWA §§ 1342(b), 1344(g), (h).
71. CWA §§ 1311, 1312. For a discussion of the link between nonpoint sources and water quality-related effluent limitations for point sources, see below Part 3.2.
72. CWA § 1362(14).

municipal stormwater drains, which typically are considered nonpoint sources in Australia, do require NPDES permits.[73]

Permits for municipal separate storm sewer systems – 'MS4s' – are treated differently from most other point sources. The EPA, or a state agency delegate, grants 'area-wide' permits for multiple individual point sources, either on a system-wide or jurisdiction-wide basis.[74] For example, in October 2009, one municipal stormwater NPDES permit was issued to cover 76 municipal entities across five Californian counties. It requires defined BMPs to be implemented in new developments and redevelopments, municipal operations and industrial, commercial and construction sites.[75] The permit requires permittees to produce annual reports which certify that they comply with each requirement of the permit, explain any failure to comply, and set out a schedule for reaching compliance.[76] Using the typology developed earlier, this approach can be characterised as a regulatory instrument applying design standards to multiple entities. These innovative arrangements for stormwater demonstrate the possibility of using a permitting process to mandate BMPs for multiple sources that are typically considered diffuse in Australia.

The CWA does not positively define nonpoint sources; rather, the term is understood 'by a process of exclusion', and by six key examples set out in the CWA.[77] These examples are: runoff from agricultural and silvicultural activities, runoff from construction activities, runoff and siltation from mining activities, disposal of pollutants in wells or subsurface excavations, salt water intrusion, and changes in the flow of water caused by the construction of dams and flow diversion facilities (hydro-modification). This study focuses on the first two of these as significant issues for large areas of Australia. However, the latter of these affect smaller areas of Australia, and are often intractable issues which deserve further research attention.

Municipal storm drains aside, the CWA does not directly regulate nonpoint sources. However, it does provide three regimes for states to do so. Firstly, Total Maximum Daily Load ('TMDL') designations are the goal-setting mechanism for planning actions to control nonpoint sources. Secondly, the CWA requires states to engage in planning to implement BMPs. Thirdly, the CWA establishes collaborative governance arrangements for significant estuaries.

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73. *Natural Resources Defense Council (NRDC) v Train*, 510 F 2d 692 (DC Cir 1975), affirmed by *NRDC v Costle*, 568 F 2d 1369 (DC Cir 1977); CWA§ 1342.
74. *National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges*, 40 CFR §§ 9, 122, 123, 124.
75. California Regional Water Quality Control Board, *San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (Order R2-2009-0074, NPDES Permit No. CAS612008)*, (14 Oct 2009).
76. Ibid 116.
77. Glicksman & Batzel, above n 67, n 71; CWA § 1314(f).

3.2 Setting and implementing goals for nonpoint pollution: impaired waters and TMDLs

The CWA's general approach to goal-setting is similar to that which Australian states adopt and the NWQMS reflects. A state must adopt 'designated uses' for all waters within its boundaries and determine corresponding 'water quality criteria', being the maximum concentration of a pollutant that can be allowed without jeopardising a designated use.[78] Together, these are known as water quality standards.

But the CWA also goes further, requiring a state to identify and rank in priority its impaired waters, which are those that do not meet applicable water quality standards solely by applying NPDES effluent limitations.[79] Proceeding in accordance with these ranks, a state must develop a TMDL for each impaired water, including those that are affected only by nonpoint sources,[80] and submit these to the federal EPA for approval.[81] A TMDL defines the maximum amount of a pollutant that can be 'loaded' into the waters in question from *all* sources – point sources, nonpoint sources, and natural background sources[82] – essentially, the 'maximum assimilative capacity of the receiving water body to which it applies'.[83] It must also account for 'seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality'.[84] This at least in theory addresses the problem of exogenous influences on pollution levels.

The EPA Administrator ('Administrator') can require a reluctant state to adopt TMDLs, and can establish TMDLs for a state that fails to do so, or that submits TMDLs which the EPA disapproves.[85] Should the Administrator fail to act, environmental groups can – and do – bring citizen suits to compel him or her to declare TMDLs.[86] This represents an interesting approach to delegating responsibility for setting performance standards, while making states accountable to the Federal Government and the public for actions relating to nonpoint pollution

78. CWA § 1313(c)(2)(A).
79. CWA § 1313(d)(1)(A). This list of impaired waters is commonly known as a 's 303(d) list', in reference to the section number of the CWA as it was passed as a session law.
80. *Pronsolino v Nastri*, 291 F 3d 1123, 1126 (9th Cir 2002).
81. CWA §§ 1313(d)(1)(C), (d)(2).
82. *Dioxin/Organochlorine Center v Clarke*, 57 F 3d 1517, 1520 (9th Cir 1995). The term 'load allocation' is used for the component derived from nonpoint sources, and 'wasteload allocations' for the component derived from point sources: *National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges*, 40 CFR § 130.2(g)-(i).
83. Glicksman & Batzel, above n 65, 136
84. CWA § 1313(d)(1)(C).
85. Ibid § 1313(d)(2); *Alaska Center for the Environment v Reilly*, 796 F Supp 1374 (WD Wash 1992).
86. See, generally, MP Healy, 'Still Dirty After Twenty-Five Years: Water Quality Standard Enforcement and the Availability of Citizen Suits' (1997) 24 *Ecology Law Quarterly* 393.

– no other CWA nonpoint regime does this. However, determining a TMDL has proven to be a long-drawn process. While states or the EPA have developed more than 34,300 TMDLs over the past 15 years, more than 70,000 remain to be determined, in relation to over 41,500 water bodies.[87]

TMDLs do not directly regulate nonpoint pollution – they are best considered goals. Nonetheless, including nonpoint pollution in TMDLs has significant consequences. TMDLs influence permit conditions for point sources through water quality-related effluent limitations. Accordingly, including nonpoint pollutant loads in TMDLs means that point sources may be subject to more stringent requirements to compensate for the lack of regulation of nonpoint sources. The Minnesota River Basin, discussed below, is one example of this occurring. These more stringent requirements both reduce pollution and may also transform point sources into a political lobby urging – and sometimes litigating – for nonpoint source controls.[88] Accordingly, while on its face, this regulatory structure seems to naively provide for goals but not their achievement (as discussed further below), in some instances, it cleverly draws in polluters' peers to encourage action.

More broadly, TMDLs function as 'informational tools that allow the states to proceed from the identification of waters requiring additional planning to the required plans'.[89] Once the Administrator has approved a listing of impaired waters and TMDLs, the state must incorporate it into a 'continuing planning process', which the EPA also approves.[90] Unlike developing TMDLs, however, the EPA lacks statutory power to compel a state to submit for approval or undertake a planning process to implement TMDLs: 'States must implement TMDLs only to the extent that they seek to avoid losing federal grant money'.[91] Nor may an environmental group sue to compel a state to implement a TMDL.[92] This lack of accountability is a significant flaw in the regulatory superstructure of the CWA.

87. EPA (US), *Handbook for Developing Watershed TMDLs: Draft* (2008) 2. In response to this workload, the EPA is developing a framework for developing TMDLs on a watershed scale, rather than at the scale of single 'segments' of a water body. For further guidance in relation to watershed-based permitting, see EPA (US), *Watershed-Based NPDES Permitting*, National Pollutant Discharge Elimination System <http://cfpub.epa.gov/npdes/wqbasedpermitting/wspermitting.cfm>.

88. JB Garovoy, '"A Breathtaking Assertion of Power"? Not Quite. *Pronsolino v Nastri* and the Still Limited Role of Federal Regulation of Nonpoint Source Pollution' (2003) 30 *Ecology Law Quarterly* 543, 560.

89. *Pronsolino v Nastri*, above n 80; *Alaska Center for the Environment v Browner*, 20 F 3d 981, 984-5 (9th Cir 1994).

90. CWA § 1313(e). A state's 'continuing planning process' incorporates effluent limitations for point sources, areawide waste management plans, TMDLs, procedures for revision, 'adequate implementation', and various other matters: at § 1313(e)(3). For a discussion of areawide waste management plans, see Part 3.3 of this paper and accompanying footnotes.

91. *Pronsolino v Nastri*, above n 80.

92. *Sierra Club v Meiburg*, 296 F 3d 1021, 1034 (11th Cir 2002). For a discussion of the case, see SJ Johnson, 'It All Comes Out in the Wash: *Sierra Club v Meiburg*: Nonpoint Source Pollution Continues Unabated as the Eleventh Circuit Refuses to Permit Implementation of Total Maximum Daily Loads through Citizen Suits' (2004) 57 *Arkansas Law Review* 349.

Despite this lack of accountability, some innovative schemes have arisen to implement TMDLs. The remainder of this Part introduces three examples which use regulatory, self-regulatory and economic instruments, usually in combination, to meet TMDLs by applying performance or design standards. The first two are Californian examples which directly regulate nonpoint sources, using Californian law;[93] the third relies cleverly on point source permitting to bring about reductions in nonpoint loads.

(a) Lake Tahoe – using regulatory and economic instruments to meet a water clarity TMDL

The Tahoe Regional Planning Agency ('the Agency') is a 50-year-old land use planning agency, created by an interstate compact established to protect the unique ecological values and economic productivity of the Lake Tahoe region of California and Nevada.[94] The waters of the Lake are uniquely clear, historically to a depth of 100 feet. Over several decades, fine sediment particles and nutrients (which encourage phytoplankton growth), primarily from urban runoff, have reduced the clarity of the Lake, which underpins tourism in the region.[95] This led California to include the Lake on its list of impaired water bodies, and begin the process of developing and implementing a TMDL.[96] Progress to date has promising elements worthy of elaboration and exploration – rigorous goal-setting is underpinned by good information, a firm and sufficient source of funding for the key implementing agency, a flexible compliance system, and powerful enforcement capabilities.

A rigorous, science-based process led to the goals and plan for regaining the clarity of Lake Tahoe. The Lake Tahoe TMDL, published in final form in June 2010, reconciles various different objectives adopted by California and Nevada and adopts numerical transparency goals.[97] Over ten years, a complex Lake Clarity Model was developed to link pollutant loads from all sources to clarity impacts, and determine the load reductions needed to meet the planned TMDL.[98] A Pollution Reduction Opportunity Project then assessed the cost and expected load reductions from implementing various pollution control measures. This involved developing: firstly, standardised pollutant control options ('PCOs'), for example

93. See below Part 5.
94. The compact was revised in 1980 and approved by Congress: Act of 19 December 1980, Pub L No 96-551, 94 Stat 3233; also available at Tahoe Regional Planning Agency, *About TRPA* <http://www.trpa.org/documents/about_trpa/Bistate_Compact.pdf>.
95. California Regional Water Quality Control Board, Lahontan Region and Nevada Division of Environmental Protection, *Final Lake Tahoe Total Maximum Daily Load Report* (2010) 3-1, 3-2, 3-3, 7-3.
96. Ibid 4-2, 4-3.
97. Ibid 6-1. Pursuant to the interstate compact, the Agency adopted a Regional Plan to attain and maintain water quality standards, focusing on the goal of reducing sediment and algal nutrients, with reference to numerical standards and indicators. For example, one threshold standard is to decrease sediment load to attain turbidity values not exceeding 3 NTU in littoral areas, as measured by the indicator of turbidity values at the 25-metre depth contour at certain listed locations: at 5-5.
98. Ibid 8-1, 8-2.

street-sweeping to reduce sediment-laden runoff to the Lake; secondly, 'settings', which demonstrate the pollution reduction consequences of undertaking the PCOs in different parts of the watershed; and thirdly, 'treatment tiers', being sets of PCOs categorised according to the cost and effort required to implement them.[99] This, together with stakeholder feedback, led to a Recommended Strategy, which allocated reductions among categories of sources and provided the basis for the TMDL implementation plan and five-year milestones.[100]

As a first step, implementation will involve allocating waste load allocations for urban runoff to municipalities (essentially setting performance standards for these municipalities), by requiring them to calculate their baseline load using a standardised procedure.[101] To meet their targets, municipalities will be able to use a flexible compliance system known as the Lake Clarity Crediting Program – an innovative example of a nonpoint source cap-and-trade system. Each jurisdiction will have an annual Lake Clarity Credit target, which it can achieve by applying PCOs in whatever way is most locally effective. If one jurisdiction can reduce discharges more cheaply than another, the former can pay the latter, and credits will count against the payer's target.[102] The credit system accounts for reductions and demonstrates compliance with the TMDL implementation plan. Although many entities are involved in implementing the TMDL, the Agency has a central role because its land use responsibilities grant it the power to enforce compliance with regulations by refusing permit development – a big stick indeed in the Tahoe Basin, which depends in economic terms on tourism. In practice, the Agency has not shied away from taking controversial land-use planning decisions to protect the Lake, such as imposing development moratoria,[103] even though the Agency itself is funded by US$1 billion in development fees annually.

The Lake Tahoe program involves a promising and rigorous, but nascent, combination of performance- and market-based approaches to nonpoint source management. Other very ambitious market-based projects for areas severely affected by nonpoint source pollution are at earlier pilot stages.[104] The US also offers numerous examples of more established market instruments for nonpoint

99. See, generally, California Water Boards and Nevada Division of Environmental Protection, *Lake Tahoe TMDL Pollution Reduction Opportunity Report* (2008).

100. California Regional Water Quality Control Board, above n 95, 9-1, 9-2, 10-1, 10-2. It is thought to require over 65 years to achieve the TMDL.

101. Ibid 10-5.

102. The proposed system is very complex. For further details, see Lahontan Water Quality Control Board and Nevada Division of Environmental Protection, *Lake Clarity Crediting Program Handbook for Lake Tahoe TMDL Implementation*, v 1.0 (2011).

103. Such decisions spurred litigation in, eg, *Tahoe-Sierra Preservation Council v Tahoe Regional Planning Agency*, 535 US 302 (US 2002).

104. They include nitrogen and phosphorus trading regimes to cover portions of 21 states, the pollution from which causes the large hypoxic zone in the Northern Gulf of Mexico: EPA (US), *Finalists for $3 7 Million in Water Quality Trading Funding* (4 Nov 2009).

source control,[105] encouraged by the EPA's formal Water Quality Trading Policy and federal funding.

(b) Trading among nonpoint sources in the San Joaquin Valley – using regulatory and economic instruments to meet a selenium TMDL

A selenium trading program in the San Joaquin Valley in California is one of the only long-running US trading programs solely between nonpoint sources. It is therefore an important example which both demonstrates that such programs are possible and also reveals some of the potential benefits and pitfalls.

The Grassland Area Farmers Tradable Loads Program grew from national outcry at the destructive effects on wildlife at the San Luis National Wildlife Refuge of excess selenium discharged by nearby irrigation districts. The outcry led the US Bureau of Reclamation ('Bureau') to close the main drain, which was discharging selenium-laden runoff from the area. Not being able to use this drain posed a major threat to agricultural productivity. In response, seven districts banded together and formed an agreement with the Bureau, under which regional selenium discharges were to remain below monthly and annual limits – performance standards – that were consistent with the applicable selenium TMDL.[106] The Central Valley Regional Water Quality Control Board also issued discharge requirements for the nonpoint sources, as permitted under California's Porter-Cologne Act.[107]

The trading aspect of the program was originally proposed by the NGO Environmental Defense Fund, and was ultimately designed by a committee of farmers, regulators, lawyers, environmentalists and academics.[108] It operated by allocating the regional selenium limit among the seven participating districts, allowing each district to either meet its required reductions or purchase the load allocation of another district. Penalties applied to exceedances, and districts recorded selenium loads by monitoring communal drains.[109]

Although trading was active during the early years of the program, it later diminished,[110] after government funding became available to subsidise 97 per cent of the cost of storing selenium for later treatment. As a result, stockpiling selenium became cheaper than trading, which became rare (though without the subsidy, this would not have been the case).[111]

105. For a comprehensive list of water quality trading programs in place and in development around the US, see EPA (US), *State and Individual Trading Programs* (4 Feb 2010).
106. For background information, see KH Wallace, *Trading Pollution for Water Quality: Assessing the Effects of Market-Based Instruments in Three Basins* (Masters Thesis, Massachusetts Institute of Technology, 2007) 25–8.
107. See below Part 5.
108. Wallace, above n 106, 28–9.
109. Ibid.
110. Ibid 46–7.
111. Ibid 48. Note, however, that economic incentives were not complete drivers. The program lacked perfect competition because districts wished to maintain neighbourly relationships and avoided driving 'hard bargains', and the main incentive for districts to remain under their cap was the desire to avoid bad press: at 56.

Despite trading activity diminishing, the regime brought about many benefits. It led to better monitoring – not a small feat in California's politically sensitive agricultural areas. It also induced farmers to accept unprecedented regulation in the form of the regulatory nonpoint source discharge requirements, and produced better coordination in the watershed as hostilities between environmentalists, farmers and regulators decreased. Most importantly, it reduced selenium discharges, though the subsidies later caused this to occur in a less sustainable way than would have otherwise been the case.[112]

(c) Water quality trading between point and nonpoint sources in the Minnesota River Basin: using regulatory and economic instruments to meet a phosphorous TMDL

In contrast to the rarity of nonpoint-nonpoint trading, at least 10 US states allow or plan to allow point sources to trade pollution reduction credits with nonpoint sources.[113] According to the EPA, Minnesota's Sugar Beet Cooperative ('the Cooperative') phosphorous reduction trading program is the largest such program by number of nonpoint source trades. It includes almost 600 nonpoint source sites covering 58,000 acres.[114] It is a sole source program, meaning that it covers only one point source, but includes multiple potential providers of nonpoint source offsets.

Established in 1999, the Cooperative program is driven by a permit issued by the Minnesota Pollution Control Agency to the Cooperative to build a wastewater treatment facility that would enable it to expand production.[115] To comply with a nutrient TMDL for the lower Minnesota River that prohibited any new discharges to the River,[116] the permit restricts discharges allowed during low-flow months to avoid pollution hotspots developing,[117] and requires the Cooperative to offset all discharges by reducing other nonpoint sources of phosphorous in the Basin.

The key offset providers are beet growers who reduce field runoff by implementing BMPs – design standards such as growing spring cover crops – which are specified in the permit. Cattlemen who exclude livestock from streams provide further offsets.[118]

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112. Ibid 15, 59–74.
113. The EPA lists such programs for Colorado, Delaware, Idaho, Michigan, Minnesota, North Carolina, Ohio, Utah, Wisconsin, and Wyoming: EPA (US), *List of All Trading Programs* (undated) <http://water.epa.gov/type/watersheds/trading/upload/tradingprograminfo.xls>. For EPA guidance on principles relevant to such programs, see EPA (US), *Water Quality Trading Scenario Point Source-Nonpoint Source Trading* (Jun 2009) Water Quality Trading Toolkit for Permit Writers, EPA-833-R-07-004.
114. EPA (US), *List of All Trading Programs*, ibid; EPA (US), above n 105, 3–15.
115. EPA (US), *Southern Minnesota Beet Sugar Cooperative Permit, Minnesota* (June 2009) Water Quality Trading Toolkit for Permit Writers, EPA-833-R-07-004, A-47
116. EPA (US), above n 105, 2-8, 2-11.
117. Ibid 3–9.
118. EPA (US), above n 115, A-47, A-50.

Such a scheme is not necessarily straightforward to design. In particular, setting equivalency rates between point and nonpoint sources can be complex.[119] This program adopted a 2.6:1 trading ratio, meaning that the Cooperative must remove 2.6 times its phosphorous discharges from the treatment plant, using nonpoint source projects.[120]

The program includes mechanisms for gauging implementation, but not performance. There is no monitoring of runoff from fields, but independent third party auditors verify that farmers have implemented BMPs,[121] and the Cooperative must also certify and provide photographic evidence that the BMPs are active.[122] The permit requires the Cooperative to help finance the BMP projects by establishing a trust fund, which is overseen by a board of producers, government officials and NGO representatives.[123]

The program achieves relatively small nutrient reductions compared to the total load in the large Basin, making its effects difficult to determine based on ambient water quality.[124] Nonetheless, it is calculated to have reduced phosphorous loads by almost 8 tonnes, being almost 2.5 times the reductions required by the permit.[125] The Cooperative considers the program to be cost-effective, and successful in allowing economic growth while reducing environmental impacts,[126] beyond even the level required by the program.

These examples illustrate that various regulatory and economic instruments have been used at local levels to control nonpoint sources to pursue TMDLs under the CWA. In some cases, this is achieved through controlling these sources directly, as in the Lake Tahoe and San Joaquin Valley examples. In other cases, nonpoint controls are achieved indirectly, by relating them to point source controls, as in the Minnesota River Basin. Good data and a mechanism for enforcing compliance underlie each case. Though these tools were not supported by detailed federal statutory provisions, they demonstrate that it is possible for a framework of statutory ambient water quality goals – similar to those commonly used by Australian states – to drive effective solutions.

3.3 Nonpoint Source Management Programs

The CWA's first purpose-built provision for nonpoint sources, section 319, appeared in 1987.[127] This provision represented Congress' first recognition that

119. EPA (US), above n 105, 3-20.
120. EPA (US), above n 115, A-47, A-50.
121. EPA (US), above n 105, 3-16.
122. EPA (US), above n 115, A-51.
123. Ibid A-47.
124. EPA (US), above n 105, 3-10, 3-11.
125. EPA (US), above n 115, A-47.
126. Ibid A-53.
127. This followed an initial experiment with encouraging state plans for sewage treatment plants and nonpoint pollution that is considered largely to have failed – at least in relation to the nonpoint

nonpoint sources were nationally significant, and the first targeted imposition of federal oversight in relation to these sources.[128] Section 319 applies a classic management-based standard approach. It obliges states to formulate management programs by following a prescribed process. A state must first identify waters threatened by nonpoint pollution and categories of contributing nonpoint sources. It must then specify the process for identifying BMPs and measures to control each category, and the state and local programs for controlling pollution from these sources.[129] Programs are to be developed on a watershed-by-watershed basis, 'to the maximum extent practicable'.[130]

The CWA envisions a wide range of possible state programs to implement BMPs, including regulatory and non-regulatory programs, technical or financial assistance, education, training, technology transfer, and demonstration projects.[131] States submit programs to the Administrator, who is responsible for approving or disapproving them, or suggesting revisions. The key incentive for states to submit a program is economic – states that have submitted biennial water quality reports (see Part 3.5) and have approved management programs are then eligible for federal grants.[132] The Administrator must prioritise federal funding by favouring particularly difficult, serious or interstate nonpoint pollution problems, innovative methods or practices, and comprehensive programs that include groundwater quality protection activities.[133] A state must report annually in relation to milestones and other information associated with a grant-funded management program.[134]

Despite section 319, most states have not significantly reduced nonpoint pollution. Federal grants have proven to be an insufficient financial incentive for widespread

sources. Areawide waste treatment management plans are state plans prepared for areas that have 'substantial water quality control problems': CWA § 1288(a)(1). While the major focus of the plans is constructing treatment works, they must also include processes to identify and control 'to the extent feasible' nonpoint sources such as runoff from agriculture, silviculture, and construction activities: CWA § 1288(b)(2)(F), (H). The plans are certified by the state Governor and submitted to the Administrator for approval: CWA § 1288(b)(3). The Administrator may make grants to agencies responsible for developing and operating areawide waste management plans: CWA § 1288(f). These programs are essentially voluntary, and a state faces no penalty for failing even to nominate relevant areas or agencies, and has little incentive to do so – accordingly, many states have not: VB Flatt, 'Spare the Rod and Spoil the Law: Why the Clean Water Act Has Never Grown Up Symposium: The Clean Water Act at Thirty: Progress, Problems, and Potential' (2003) 55 *Alabama Law Review* 595, 599; S Brull, 'An Evaluation of Nonpoint Source Pollution Regulation in the Chesapeake Bay' (2005) 13 *University of Baltimore Journal of Environmental Law* 221, 227.

128. Craig, above n 9, 189, 190.
129. CWA § 1329(a)(1).
130. Ibid § 1329(b)(4).
131. Ibid § 1329(b)(2)(B).
132. Ibid § 1329(d), (h).
133. Ibid § 1329(h)(5).
134. Ibid § 1329(h)(11). The EPA releases guidelines on funding guidelines and monitoring and reporting requirements for state management programs. These guidelines are available online from the EPA: EPA (US), *Clean Waters Act Section 319: Laws, Regulations, Treaties*, 'Nonpoint Source Management Program – Clean Water Section 319' <http://water.epa.gov/polwaste/nps/cwact.cfm>.

action, and the EPA does not punish states that ignore or violate the provision.[135] It has, though, produced some innovative and successful approaches to nonpoint pollution. The EPA maintains an online compilation of 'section 319 success stories'. In each case, grant funding has enabled actions under a management program that have so improved the quality of nonpoint pollution-impaired waters that they can be removed from a state's list of impaired water bodies. All but one US state is represented in this compilation.[136]

A review of each of the 115 current 'section 319 success stories' compiled by the EPA as of October 2010[137] reveals that the vast majority (around 87%) are structural or education-based projects focusing on a particular segment of an impaired water body,[138] rather than programs that involve implementing or changing large-scale regulatory or institutional mechanisms. These types of projects resemble those that Australian regional NRM agencies commonly promote and part-finance. One striking characteristic of the US projects is their apparent tendency to include a large variety of stakeholders, for example, university extension officers, the federal resource conservation service, municipal employees, residents, and state departments of health and environment.[139] This points to the potential importance of section 319 programs from a process standpoint – encouraging collaboration and information sharing – apart from their direct substantive effects. These process benefits are even more strongly apparent in relation to the CWA's National Estuary Program.[140]

The minority of 'success stories' that do have an institutional or regulatory flavour occupy not only the less politically challenging areas of urban and peri-urban land use ordinances,[141] but also the more controversial realms of agriculture and forestry. They use regulatory and economic instruments and apply all types of standards. Section 319 programs produced an ordinance that imposed minimum

135. Brull, above n 127, 228–9.

136. That state is Florida.

137. Each of these 115 success stories was reviewed to determine whether grant funding included a regulatory or institutional component, for example whether funding had helped establish or modify an ordinance or regulation. For the compilation of success stories, see EPA (US), 'Section 319 Nonpoint Source Success Stories' (18 Nov 2010) <http://water.epa.gov/polwaste/nps/success319>.

138. Common examples include engineering solutions (eg, Las Vegas Wash, NV; Bog Brook, NH; West Sandy Creek, TN), financial and technical assistance to farmers to install alternative stock watering facilities and fencing to protect riparian areas (eg Furlong Creek, MI; Little Ivy Creek, NC), encouraging farmers to adopt nutrient management plans and no-till seed drilling (eg Pigeon Creek, IN, Banner Creek Reservoir, KS), converting sensitive areas to forest (eg Dutchman Creek, IL) or renovating pasture lands to reduce erosion (eg Wades Branch, TN): ibid.

139. See, eg, the accounts of Vandalia Lake, MO and Swan 5A Reservoir, NE: ibid.

140. See below Part 3.4.

141. See, eg, the accounts of Tangipahoa River, LA (ordinance requiring inspections of home sewage systems for new residences and at change of residence, before permitting an electrical connection); Cobbossee Lake, ME (ordinances requiring 'new developments to be designed to meet strict phosphorous allocation standards for stormwater runoff'); Holmes Lake, NE (pet waste ordinance); Chase and Slide Brooks, VT (law requiring developments that disturb more than 10 acres to have a comprehensive water quality remediation plan): ibid.

standards and specifications for dairy waste discharge systems in Louisiana, and a requirement for dairies to adopt nutrient management plans and undergo regular inspections in Washington.[142] They led to the use of conservation easements in agricultural watersheds in North Carolina and Wisconsin to reduce sediment-laden runoff,[143] and contracts with farmers to use BMPs in North Carolina.[144] More ambitiously, section 319 programs have established a point source-nonpoint source trading program and a nutrient control strategy in North Carolina;[145] a scheme for scheduling grazing permits to reduce riparian damage and bank erosion contributing sediment to a stream in Wyoming;[146] and entirely new forest practices legislation to reduce phosphorous and sediment in runoff in Maine.[147]

3.4 The National Estuary Program

The CWA's National Estuary Program ('NEP') takes a fundamentally different perspective on nonpoint pollution than the perspectives inherent in TMDLs and section 319 programs. These latter measures tend to treat water pollution in isolation, generally without an explicit ecological focus. They also give states complete discretion with respect to institutional aspects of program delivery. In contrast, the NEP requires a collaborative governance approach within the superstructure of a management-based regulation framework. To Australian eyes, it appears to be the statute-based cousin of Australian policy-based Water Quality Improvement Plans. The NEP seeks to protect the nation's important and threatened estuaries holistically, treating pollution as one of a suite of environmental concerns. Nutrients, toxics, pathogens and sedimentation are concerns for the vast majority of these significant estuaries.[148] Other equally prevalent concerns include habitat loss, species decline, invasive species, and population growth.[149]

As in the CWA's other measures, states are responsible for initiating programs, but the Federal Government plays a larger role. A Governor may nominate to the Administrator 'an estuary of national significance' (of which there are now 28)[150] and request a management conference to develop a management plan for the estuary.[151] The Administrator convenes a management conference if he or she is convinced that:

142. See, eg, the accounts of Tangipahoa River, LA; and Lower Nooksack River and South Fork Skagit River, WA, respectively: ibid.
143. See, eg, the accounts of Mills River, NC; Bass Lake, WI; West Branch Sugar River, WI. ibid.
144. See, eg, the account of Smith Creek, NC: ibid.
145. See, eg, the account of Tar-Pamlico Basin, NC: ibid.
146. See, eg, the account of Hunter Creek, WY: ibid.
147. See, eg, the account of Madawaska Lake, ME: ibid.
148. B Burgan & V Engle, *National Estuary Program Coastal Condition Report, EPA-842/B-06/001* (EPA (US), 2006) 41
149. Ibid.
150. The EPA maintains a map-based database of NEP areas: EPA (US), *Local NEP Projects and Regional Summary* (11 Sep 2009) 'Habitat Protection' <http://www.epa.gov/owow_keep/estuaries/pivot/habitat/hab_fr.htm>.
151. CWA § 1330(a)(1).

> [T]he attainment or maintenance of that water quality in an estuary which assures protection of public water supplies and the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife, and allows recreational activities, in and on the water, requires the control of point and nonpoint sources of pollution to supplement existing controls of pollution in more than one State.[152]

The conference itself is best considered a form of collaborative, multi-jurisdictional management planning institution. It involves assessing data on the water quality, natural resources, and uses of the estuary; identifying the causes of environmental problems; characterising point and nonpoint loads; developing a 'comprehensive conservation and management plan' (CCMP); and developing plans for implementation and monitoring.[153] The process is intended to take multiple years.[154]

The collaborative governance model requires broad participation in the conference. Participants must include relevant states, international, interstate or regional agencies or entities having jurisdiction over any part of the estuary, local governments, affected industries, educational institutions, and the general public, as the Administrator deems appropriate.[155] The management conference falls away after a CCMP is approved, to be replaced by the institutional arrangements set out in the CCMP.

The Administrator may approve the plan if the Governors of the relevant states agree. Federal cost-share funding is available to help implement approved CCMPs.[156] Other than constraining certain federal activities,[157] CCMPs are not directly enforceable regulation. However, they contain recommendations for changing regulations or creating new ones, and can act as a catalyst for doing so.[158]

The NEP model has been praised for doing away with artificial political boundaries in pollution management and 'increasing public confidence in the final product' through broad-based and transparent processes.[159] Some potential concerns relate to transaction costs and the lack of objective standards for the contents of the plan.[160] Empirical statistical analyses comparing NEP estuaries with non-NEP estuaries have found that the former more effectively resolve conflict and build

152. Ibid § 1330(a)(2)(A).
153. Ibid § 1330(b).
154. Ibid § 1330(e).
155. Ibid § 1330(c).
156. Ibid § 1330(f), (g).
157. Ibid § 1330(b)(7).
158. MW Bowden, 'An Overview of the National Estuary Program' (1996) 11 *Natural Resources and Environment* 35, 37.
159. HM Babcock, 'Dual Regulation, Collaborative Management, or Layered Federalism: Can Cooperative Federalism Models from Other Laws Save our Public Lands?' (2008) 14 *Hastings West-Northwest Journal of Environmental Law and Policy* 449, 474–5.
160. Ibid.

cooperation among stakeholders than the latter.[161] Admittedly, though, this is only an indicator of overall outcomes, and more research is required to determine whether the process improves water quality, and specifically nonpoint pollution.[162] Nonetheless, the NEP example of Tampa Bay demonstrates that this approach can produce, within a broad management-based superstructure, an effective, predominantly performance-based self-regulatory regime to address nonpoint pollution – an enduring gap in the fabric of Australian policy for nonpoint pollution.

(a) The Tampa Bay Estuary Program

The Tampa Bay Estuary Program is a NEP nonpoint pollution success. A legally binding agreement anchors the Program despite the lack of any requirement to have one. Most importantly, the recovery of the Bay ecosystem from nitrogen pollution is apparently 'unprecedented among urban estuaries worldwide', even against the background of strong population growth.[163] Interestingly, this occurs outside the TMDL framework of the CWA – indeed, maintaining this independence is a motivating factor for participants.

As the largest open-water estuary in Florida, Tampa Bay is economically important as the location of three major seaports, ecologically diverse, and an important nursery and habitat area for sealife. It is also populated by more than three million people and subject to heavy use by tourists.[164] Seagrass meadows are ecologically crucial to the Bay, but are threatened by development and by light attenuation caused by algae fuelled by nitrogen loading, the biggest source of which is runoff from urban, residential and agricultural land.[165]

The Tampa Bay Estuary Program was established in 1991 by three counties, three cities, a water management district, and the state and federal environment departments acting jointly.[166] It adopted its first CCMP in 1997, and updated it in 2006. The conference which adopted the initial CCMP included over 100 members from a very wide range of groups, including local, state and federal government officials, environmental scientists, business owners, and citizens.[167]

161. See generally M Lubell, 'Resolving Conflict and Building Cooperation in the National Estuary Program' (2004) 33 *Environmental Management* 677. Empirical research on the NEP tends to concentrate on institutional collective action problems, since NEP programs richly illustrate collaboration between natural resources management agencies: see, eg, R Berardo & JT Scholz, 'Self-Organizing Policy Networks: Risk, Partner Selection, and Cooperation in Estuaries' (2010) 54 *American Journal of Political Science* 632; LA Mandarano, 'Social Network Analysis of Social Capital in Collaborative Planning' (2009) 22 *Society and Natural Resources* 245.
162. Lubell, ibid, 689.
163. Tampa Bay Estuary Program, *2010–2011 Annual Workplan and Budget* (2010) 14. An EPA report offers a more modest assessment, concluding that nitrogen loads have decreased and seagrass meadows have steadily recovered since the inception of the NEP program: Burgan & Engle, above n 148, 265.
164. Burgan and Engle, ibid 255–6.
165. Ibid 259, 262; N Holland, MK Hoppe & L Cross, *Charting the Course: The Comprehensive Conservation and Management Plan for Tampa Bay* (2006) 3.
166. Holland, Hoppe & Cross, ibid, VIII.
167. Ibid XII-XVII.

The plan contains a description of the Bay, goals and priorities, action plans and schedules across eight key areas (one of which is water quality), implementing and financing, and monitoring.

In 1998, the Estuary Program members and six others signed a legally binding set of agreements (the Interlocal Agreement) to implement the CCMP,[168] and fund implementation in proportion to the signatories' local populations.[169] The Interlocal Agreement allocates specific nitrogen loading reductions to individual members and to the Nitrogen Management Consortium (a public-private alliance described further below), and requires them to submit for approval action plans, to be revised annually, in pursuit of their respective goals.[170] It also establishes the Program's ongoing governance structure as a special district under Florida statute – a form of specialised local government common in the US.[171] Under the agreement, local agencies agree to consider waiving or changing their rules to facilitate the implementation of appropriate projects and review their regulatory processes regularly to ensure they assist in meeting the CCMP goals.[172] Non-compliance with the Agreement is punished by expulsion and non-return of the funds contributed to the Program.[173]

The key water quality goal of the 2006 CCMP is to reduce nitrogen contributions to the Bay by 17 tons per year to enable seagrass areas to recover further.[174] Ambitiously, the plan measures success in relation to water quality by the extent of seagrass recovery[175] – a brave choice of metric, given the potential influence of exogenous factors.

The CCMP quantifies nitrogen loads by drainage basin and source, for example, industrial point sources, runoff, and atmospheric deposition.[176] It focuses actions accordingly, using a combination of regulatory, economic and self-regulatory instruments to apply performance and design standards. Local government actions to reduce nitrogen include changing landscaping practices in public areas, imposing strict requirements in relation to commercial landscaping,[177] and imposing stormwater standards on redeveloped properties.[178] The water management district encourages farmers to adopt BMPs through financial assistance.[179] At the state level, actions included revising BMPs for the landscape industry and

168. Ibid VIII.
169. Ibid 133.
170. 'Tampa Bay National Estuary Program Interlocal Agreement' (27 Feb 1998) <http://www.tbep.org/pdfs/interlocal_agreement.pdf> 15.
171. Ibid 7–12.
172. Ibid 13–14.
173. Ibid 18.
174. Holland, Hoppe & Cross, above n 165, 18.
175. Ibid 23.
176. Ibid 26–7.
177. Ibid 32–4.
178. Ibid 42.
179. Ibid 39.

developing model landscaping guidelines for commercial use.[180] Recently, estuary program staff developed a regional model ordinance on non-agricultural fertiliser application in cooperation with industry and environmental groups.[181]

A key feature of the CCMP, the Nitrogen Management Strategy, rests both directly on government entities, and also on a public sector-private sector alliance – the Nitrogen Management Consortium. The Consortium includes members from electric utilities, industry, agriculture, local government and regulatory agencies.[182] Each member accepts a performance standard by pledging to undertake projects attributed with reducing nitrogen loads by quantified amounts, such that the public and private sectors evenly share the load reductions. Members use a database which calculates nitrogen reductions based on land use type, location, and treatment method in a similar but apparently simpler mechanism than the Lake Tahoe Clarity Model. This not only enables them to track their progress against their individual goals, but has also assured regulatory agencies that the Nitrogen Management Strategy is meeting its goals, such that it is unnecessary to designate and implement a TMDL.[183]

The Tampa Bay Estuary Program demonstrates a truly collaborative approach to nonpoint pollution, which has extended beyond broad-based participation in formulating the plan to effective private sector implementation. It also further suggests the value to a planning process of good data and targeted information that enable participants to quantify the effects of their activities. Finally, it provides an example of successfully linking ecological goals to water quality targets.

3.5 Other arrangements associated with nonpoint pollution

In addition to encouraging, overseeing and funding state action on nonpoint pollution, the EPA also plays a part in shaping state responses to nonpoint pollution through its advisory role. After consulting with federal and state agencies, the Administrator is to issue 'guidelines for identifying and evaluating the nature and extent of nonpoint source pollutants' and information on 'processes, procedures, and methods to control pollution' resulting from several specific categories of nonpoint sources.[184]

The EPA also oversees state performance in relation to nonpoint pollution more generally, under a state reporting system mandated by the CWA. The Administrator receives and transmits to Congress[185] water quality reports, which states are obliged to provide biennially, and which, by and large, they do.[186] The reports must

180. Ibid 32, 33.
181. Tampa Bay Estuary Program, above n 163, 7.
182. Holland, Hoppe and Cross, above n 165, 23.
183. Ibid 135.
184. CWA § 1314(f).
185. Ibid § 1315(b)(2).
186. See EPA (US), *National Water Quality Inventory Report to Congress* (26 Apr 2010) 305b.

contain, among other things, 'a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs'.[187] In addition, states must report in respect of publicly-owned lakes, 'an assessment of the status and trends of water quality in lakes ... [including] the nature and extent of pollution loading from point and nonpoint sources' and 'a description of procedures, processes, and methods (including land use requirements), to control sources of pollution of such lakes'.[188] These reports are also 'the primary vehicle for informing ... the public about general water quality conditions in the United States'.[189] Thus, despite the weak mandatory aspects of federal-state relations, which characterise most elements of the management-based superstructure of the CWA relating to nonpoint pollution, this detailed reporting structure injects a measure of overall accountability.

Finally, it is worth mentioning one prominent feature of the CWA which has not (yet) been extended to nonpoint sources, but which scholars contend should be. The CWA permits any citizen who has an interest which is or may be adversely affected to bring a lawsuit against any person, which includes a government, who is alleged to be in violation of an effluent standard or limitation (which apply to point sources).[190] A citizen may also bring a lawsuit against the Administrator where they allege a failure 'to perform any act or duty under this Chapter which is not discretionary'.[191] Such lawsuits have proven very powerful in the point source context.[192] Unfortunately, several courts have concluded that this provision does not cover nonpoint pollution.[193]

Commentators have argued powerfully that merely extending citizen suit provisions to cover nonpoint pollution would significantly increase the effectiveness of the CWA and avoid the political difficulties of extending federal power or responsibility over the issue.[194] An expanded provision would enable a person to bring a civil action under the CWA against 'nonpoint sources that either cause violations of the state water quality standards or fail to comply with State BMP requirements', or would require states to include such a provision in their laws.[195] In regulatory theory terms, it would bolster the CWA's management-based superstructure with 'toothy' performance standards at local levels. It would also be consistent with the general view that management planning is suited to situations in which governments have low capacity to assess performance. Such

187. CWA § 1315(b)(1)(E).
188. Ibid § 1324(a)(1)(B), (F).
189. EPA (US), above n 186.
190. CWA § 1365.
191. Ibid § 1365(a)(2).
192. Craig, above n 9, 233.
193. Ibid 220. However, note that citizens have successfully sued federal nonpoint sources for violating another CWA provision, by using a general judicial review law: at 222–4.
194. Ibid 183, 232–3.
195. Ibid 232.

an innovation is also relevant to consider in the Australian context, since we too have adopted citizen suit provisions in the environmental arena.[196]

4. CONTROLLING NONPOINT POLLUTION UNDER THE COASTAL ZONE MANAGEMENT ACT

To a large extent, the Coastal Zone Management Act ('CZMA') follows the familiar pattern of the CWA's nonpoint regimes, but applies only to the 'coastal zone', which includes the northern freshwater coast.[197] A key difference is that the CZMA imposes minimum program requirements, requires programs to be enforceable, and requires proof at the planning stage that implementation is likely to be successful. The CZMA tips the scale of federal-state power towards the Federal Government, using rigorous minimum management standards rather than dictating particular approaches, thereby minimising political fallout.

Like the CWA, the CZMA is a vehicle for the federal government to encourage and fund state management planning, including for pollution issues. The CZMA explicitly recognises that 'state and local institutional arrangements for planning and regulating land and water uses in such areas are inadequate', and seeks to assist states to deal with such issues where they are of 'more than local significance'.[198] The CZMA requires more of states than the CWA and even grants them a degree of control over the Federal Government, by enabling them to review the consistency of federal actions with their plans.[199] The CZMA is administered by the Office of Ocean and Coastal Resource Management of the National Oceanic and Atmospheric Administration ('NOAA') in the Department of Commerce, jointly with the EPA.

Some assessments of the CZMA conclude that states have not implemented and enforced coastal management programs to the full extent desirable.[200] Others hail it as a significantly improved approach to nonpoint pollution, and have called for the CWA to mirror it, so that its more rigorous requirements can have benefit

196. See, eg, Protection of the Environment Operations Act 1997 (NSW) s 253; Environment Protection and Biodiversity Conservation Act 1998 (Cth) s 487.

197. 'Coastal zone' is defined as 'the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches.... The zone extends inland from the shorelines only to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters, and to control those geographical areas which are likely to be affected by or vulnerable to sea level rise.' Coastal Zone Management Act, 16 USC § 1453(1).

198. Ibid § 1451(h), (i).

199. This element is the subject of much scholarly commentary, but is beyond the scope of this paper. It is dealt with in detail in: EM Cheston, 'An Overview and Analysis of the Consistency Requirement under the Coastal Zone Management Act' (2003) 10 *University of Baltimore Journal of Environmental Law* 135.

200. S Kalen, 'The Coastal Zone Management Act of Today: Does Sustainability Have a Chance?' (2006) 15 *Southeastern Environmental Law Journal* 191.

beyond the narrow coastal strip.[201] This study concludes that CZMA requirements hold significant promise for dealing with nonpoint pollution. It therefore discusses the nonpoint aspects of the statute in detail.

4.1 Coastal management programs in general

The CZMA requires a coastal state to prepare a coastal zone management program and submit it to the Secretary of the Department of Commerce ('the Secretary') for approval.[202] A state is eligible for federal funding to administer its program, provided it meets the requirements of the CZMA and rules and regulations.[203] The key procedural requirements for developing a program are to hold public hearings, enable relevant agencies and interested parties to participate, and coordinate the program with other plans that apply to the coastal zone.[204] The Governor designates a single state agency to implement the program, but the program itself must include a mechanism for continuing consultation with other relevant agencies and for ensuring that state agencies adhere to the program.[205]

Somewhat surprisingly, the CZMA is relatively aggressive in requiring state programs to be enforceable, both in general, and also specifically in relation to controlling nonpoint pollution. A state must, among other things, set out mechanisms for controlling land and water uses. These mechanisms must include one or more of: enforceable state-level criteria and standards for local implementation; direct state regulation of land and water use planning; and state administrative review of the consistency of the program with 'all development plans, projects, or land and water use regulations'.[206] Most importantly, the program must include 'enforceable policies and mechanisms to implement the applicable requirements of the Coastal Nonpoint Pollution Control Program'.[207] This is the core of the CZMA's approach to nonpoint pollution.

4.2 Coastal Nonpoint Pollution Control Programs

Established by 1990 amendments to the CZMA, the purpose of the Coastal Nonpoint Pollution Control Program ('coastal nonpoint program') is for an implementing agency to 'develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other State and local authorities'.[208] This program is to 'serve as an update and expansion of the State nonpoint source management program ... [as that program] relates to land and water uses affecting coastal waters'[209] and

201. Craig, above n 9, 194–5, 231–2.
202. CZMA § 1454.
203. Ibid § 1455(b).
204. Ibid § 1455(d)(1), (3), (4).
205. Ibid § 1455(d)(3)(B), (6), (15).
206. Ibid § 1455(d)(11).
207. Ibid § 1455(d)(16).
208. Ibid § 1455b(a)(1).
209. Ibid § 1455b(a)(2).

to strengthen the links between Federal and State coastal zone management and water quality programs'.[210]

Unlike the CWA's nonpoint regimes, coastal nonpoint programs must meet minimum standards to obtain federal approval. The most important of these is providing for the implementation of 'management measures' which conform with relatively detailed federal guidance.[211] Programs must also: (1) identify land uses which may contribute to water quality problems; (2) identify critical coastal areas where land uses must be subject to management measures; (3) implement management measures in those areas; (4) provide technical assistance to local governments and the public to implement the measures, including assistance in developing regulations or incentives; (5) provide opportunities for public participation in all aspects of the program; (6) establish mechanisms to improve coordination between state and local officials with roles in land use, water quality, habitat protection, and public health; and (7) propose any modifications to the state's coastal zone required to control land and water uses that are significant from a water quality perspective.[212]

Management measures are central to coastal nonpoint programs. They are defined as:

> [E]conomically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives.[213]

They are 'integrated systems of practices' which are broader than BMPs.[214] But they are still based primarily on design standards, analogous to NPDES requirements for point sources, rather than on water quality goals like TMDLs.[215] A second tier of 'additional management measures' is intended to attain and maintain water quality standards if federally specified management measures are insufficient.[216]

The definition of management measures contains the limiting phrase 'economically achievable'; however, federal agencies retain the upper hand in the matter by publishing guidance that sets out a menu of structural and non-structural management measures, monitoring requirements, and their

210. *Coastal Nonpoint Source Pollution State Program Guidance Documents: Notice of Availability of Final Guidance Documents*, 58 Fed Reg 5184.
211. CZMA § 1455b(b).
212. Ibid.
213. Ibid § 1455b(g)(5).
214. A Beier, S Dressing & Lynn Shuyler, 'A New Approach to Runoff: State Coastal Nonpoint Pollution Control Programs' (1994) 49 *Journal of Soil and Water Conservation* 4, 73.
215. *Coastal Nonpoint Source Pollution State Program Guidance Documents*, above n 210.
216. EPA (US), *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (1993) 2.

costs.[217] Federally specified management measures apply to the following categories of sources: agricultural sources, forestry, urban areas, marinas, channel modification and shoreline erosion, and wetlands and riparian areas, as well as accompanying monitoring techniques.[218] Interestingly, this excludes some of the nonpoint sources explicitly listed in the CWA.[219] The guidance also includes management *practices*, which are used to implement a management measure, for illustrative purposes.[220] A state may exclude a category of nonpoint source from its program only if that category is 'neither present nor reasonably anticipated', or where those sources 'do not and are not reasonably expected to present significant adverse effects to living coastal resources or human health'.[221] To demonstrate that management measures conform to this guidance, the measures in a state's program must either be 'identical to, or [be] demonstrated to be as effective as, the ... guidance measures'.[222]

Although the statute contains no penalties for failing to implement a program within regulatory timelines[223] – only for failing to submit an approvable program within the statutory time period[224] – federal agencies require evidence of implementation-readiness and enforceability before they will approve a program. For each management measure, the program must designate a lead agency, the legal authorities used to implement the measures, how the agency will implement them, and a schedule for doing so.[225] This amounts to a kind of comprehensive 'proof of concept' requirement.

To meet enforceability requirements, 'policies and mechanisms may be state and local regulatory controls, and/or non-regulatory incentive programs combined with state enforcement authority'.[226] If the state coastal agency will not be exercising enforcement authority for a particular management measure, the program must

217. CZMA § 1455b(g).
218. EPA (US), above n 216. For example, the irrigation water management measure requires ensuring that water applied matches crop water needs by measuring soil water depletion and applied water, and uniformly applying water; and installing backflow preventers and controlling deep percolation where chemigation is practised: EPA (US), *Coastal Zone Act Reauthorization Amendments*, 'Irrigation Water Management' (1993) <http://water.epa.gov/polwaste/nps/czara/ch2-2f.cfm>.
219. See above n 77 and accompanying text.
220. For example, a management practice for the irrigation water management measure is using a water-measuring device such as a water meter.
221. EPA (US), above n 216, 11–12.
222. Ibid 12–14.
223. States originally were to implement the measures in a phased way, to be complete in 2003: 58 Fed Reg 5185. These timelines were later extended to provide for a 15-year strategy from the date of approval: EPA (US), *Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 ('CZARA')* (1998) 3.
224. CZMA § 1455b(c). Penalties take the form of withholding a portion of grant funds, not only for developing coastal programs (including programs other than nonpoint programs), but also funds for nonpoint programs under the CWA § 1455b(c)(3), (4).
225. EPA (US), above n 216, vi.
226. Ibid vii.

include provisions and documentation to ensure that the governmental body with the relevant statutory authority actually exercises that authority. States must submit memoranda of understanding, executive orders or administrative directives to document this.[227] The program should also include periodically inspecting sources to monitor implementation and enforcement.[228] Regulatory approaches suggested by the federal guidance include permit programs, local zoning, and direct state statutory requirements. One suggested permit program would require a general permit for specific categories of sources, for example to require 'farmers to adopt management measures for various facets of their operation [chosen] from technical guidance provided by the state'[229] – mirroring arrangements for MS4s under the CWA. Suggested non-regulatory approaches include economic incentives such as tax credits, deductions, or rebates for implementing management measures; economic disincentives such as fees, taxes or price increases for targeted items; pollution trading; or requiring performance bonds before nonpoint activities begin.[230]

Subsequent changes to the guidance seem to provide more scope for voluntary programs, but require a state to meet a high standard of proof in relation to the program's likely effectiveness. A program containing voluntary elements, backed by existing state enforcement authorities, is approvable only if it meets certain criteria. The State Attorney-General must certify that those authorities can be used to prevent nonpoint pollution and require management measures to be implemented; the program must include methods for tracking and evaluation; and the program must includes a mechanism for linking the implementing agency with the enforcement agency, and 'a commitment to use the existing enforcement authorities where necessary'.[231]

The Administrator and the Secretary provide technical assistance in developing and implementing programs. Although most areas of assistance are scientific, the statute also provides for regulatory assistance, by, for example, maintaining an inventory of model ordinances for identifying, developing, and implementing pollution control measures.[232]

As at July 2011, of the 29 coastal states, 17 had fully approved coastal nonpoint programs. The remaining 12 had been conditionally approved, with full approval requiring the plan to be revised, for example, to demonstrate conformity with the management measures or to include mechanisms to demonstrate implementation and enforceability.[233] Gaps of between two and thirteen years may separate

227. Ibid 17.
228. Ibid.
229. Ibid 29.
230. Ibid 30–32.
231. EPA (US), above n 223, 4.
232. CZMA § 1455b(d)(3).
233. National Oceanic and Atmospheric Administration ('NOAA') (US), *Coastal Nonpoint Program Approval Findings* (7 Jul 2011) <http://coastalmanagement.noaa.gov/nonpoint/pro_approve.html>.

conditional and final approvals, but several recent final approval dates demonstrate that the program is still attractive to states. Equally, these gaps suggest that federal agencies are applying rigorously the statutory requirements as to implementation readiness and enforceability.

Although the CZMA provides no remedies against states that do not implement their plans, after the fact, it can at least ensure from the outset that they have rigorously considered nonpoint source problems, and that they have credible legal powers to address them, and a schedule and designated responsible parties for doing so. The requirement of states to provide proof of this at the program approval stage would seem also readily applicable to voluntary programs for nonpoint pollution, and even natural resources management generally. Injecting management-based programs with similar minimum standards, including requiring regulatory measures, would fill a key gap in the fabric of Australian approaches to controlling nonpoint pollution. The remainder of this Part offers examples of how states have met these requirements.

(a) Examples of meeting CZMA coastal nonpoint program requirements: New Jersey and New Hampshire

Thirteen years after having its coastal nonpoint program conditionally approved, New Jersey received final approval of its program in January 2010. The conditional approval contained numerous conditions in relation to several categories of nonpoint sources. The condition in relation to agricultural nonpoint sources is instructive. New Jersey's initial submission was found successfully to have identified management measures that conformed with federal specifications, and identified legal authorities to enforce them. Specifically, the state implemented and funded management measures through voluntary farm conservation plans provided for in agricultural regulations – a management-based approach. This voluntary structure was backed by a power to bring enforcement actions against farmers who caused water quality violations under the Water Pollution Control Act ('Pollution Act'). Despite these factors, NOAA and the EPA found that New Jersey had 'not yet demonstrated its ability to ensure implementation throughout the ... management area', which covers the entire state.[234] Accordingly, as a condition of final approval, New Jersey needed to implement fully its management measures for agriculture.

New Jersey fulfilled this condition in several ways. The state agency responsible for enforcing the Pollution Act entered into a memorandum of agreement with the Department of Agriculture and the State Soil Conservation Committee, which are responsible for implementing the relevant agriculture statute.[235] The

234. NOAA (US), *Findings for the New Jersey Coastal Nonpoint Program* (18 Nov 1997), II (Agriculture).

235. NOAA (US) and EPA (US), *New Jersey Final Decision Document NOAA/EPA Decisions on Conditions for the New Jersey Coastal Nonpoint Program* (28 Jan 2010) 1–3.

agreement included: a goal of developing farm conservation plans for all farms, where required to comply with the CZMA; a commitment to fund these farm plans in targeted watersheds; and requirements to report to the EPA details of BMP implementation and load reduction calculations. Other components of the response included introducing rules to require all farms handling animal waste to develop animal waste management plans, and various programs which offer incentives to farmers to enter rental agreements or permanent easements requiring them to use conservation practices on agricultural land. Finally, an attorney-general's opinion clarified how the Pollution Act could be used in relation to nonpoint sources, and provided evidence of past such enforcement actions relating to agriculture.

New Hampshire's coastal nonpoint program uses a predominantly non-mandatory approach, relying heavily on funding local-level voluntary actions and technical assistance programs.[236] Despite its voluntary nature, its coastal nonpoint program has been fully approved since 2001 as meeting the strict requirements of the CZMA, the EPA considers it a success story, and a recent formal evaluation found various nonpoint actions to be effective.[237] New Hampshire fulfilled the CZMA requirements by providing an attorney-general's legal opinion that three existing state laws provided sufficient legal authority to control nonpoint pollution for each category of nonpoint source.[238] However, progressing from conditional to final approval required the state to demonstrate that exemptions within state laws did not prevent the full implementation of management measures. For example, it demonstrated that statutory exemptions for clearing agricultural land would only apply if the activity complied with BMPs related to protecting water quality, and that a violator could be compelled to comply under the statute.[239]

5. CONTROLLING NONPOINT POLLUTION UNDER CALIFORNIA'S PORTER-COLOGNE WATER QUALITY CONTROL ACT

Independent of federal structures, state statutes offer further instructive examples of effective regulatory and institutional approaches to nonpoint pollution. California's water quality law, the Porter-Cologne Water Quality Control Act ('PCA'), takes a significantly more aggressive approach to nonpoint pollution than do the federal statutes. Indeed, the power of state agencies under the PCA directly to regulate

236. NOAA (US), *Final Evaluation Findings: New Hampshire Coastal Program - October 2003 through August 2006* (2007) 18.

237. NOAA (US), *NOAA/EPA Decisions on Conditions of Approval New Hampshire Coastal Nonpoint Program* (4 Oct 2001) Coastal Nonpoint Program Approval Findings; NOAA (US), *New Hampshire Builds Local Capacity to Reduce NPS* (13 Jan 2010) General Success Stories; NOAA, above n 234, 17-20.

238. These statutes are the *New Hampshire Water Pollution and Waste Disposal Act* (NH Rev Stat Ann Ch 485-A), the *New Hampshire Fill and Dredge in Wetlands Act* (NH Rev Stat Ann Ch 482-A), and the *New Hampshire Comprehensive Shoreland Protection Act* (NH Rev Stat Ann Ch 483-B): NOAA (US), *NOAA/EPA Decisions on Conditions of Approval: New Hampshire Coastal Nonpoint Program* (4 Oct 2001) Coastal Nonpoint Program Approval Findings 2.

239. Ibid 7.

nonpoint sources, including agriculture, is unusual and perhaps unique across US state laws.[240] Although, historically, important nonpoint sources have been exempt from regulation, this is now changing, at least in some regions. The PCA is an important further demonstration of the feasibility of nonpoint source regulatory permitting and broad-based agency collaboration on pollution problems.

In institutional terms, the PCA builds California's water quality architecture. It establishes the State Water Resources Control Board (State Board) and nine Regional Water Quality Control Boards (Regional Boards) as 'the principal state agencies with primary responsibility for the coordination and control of water quality', including diffuse pollution.[241] Each Regional Board is to have regional water quality control plans (commonly called basin plans) for the areas in the region,[242] which are binding on state entities.[243] Basin plans adopt the familiar framework of water quality objectives and beneficial uses as goal-setting mechanisms, and include a program of implementation.[244] The Act also includes a broadly-worded prohibition on discharging waste 'where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance'.[245]

The PCA contains two regulatory methods specifically for dealing with nonpoint pollution. Firstly, any person discharging waste, including from nonpoint sources, must report the discharge to their Regional Board and pay an annual fee, unless a waiver applies.[246] A Regional Board may only grant a waiver if it would be consistent with the applicable basin plans and would be in the public interest. A Regional Board imposes either general (based on discharge category) or individualised requirements on waste discharges based on its basin plans and factors including the '[e]nvironmental characteristics of the hydrographic unit' and economic considerations.[247]

Secondly, the PCA obliges the State Board, in consultation with various other groups, to prepare a detailed program that implements the nonpoint planning requirements of both the CWA and the CZMA.[248] The plan focuses on design standards. It must provide for 'nonregulatory implementation' of BMPs, 'regulatory-based incentives for BMPs', and the 'adoption and enforcement of waste discharge requirements that will require the implementation' of BMPs.[249] The State Board must also provide guidance on how to enforce these elements of

240. Wallace above n 107, 28.
241. Cal Water Code, § 13001.
242. Ibid § 13164.
243. Ibid § 13247.
244. Ibid §§ 13050, 13240.
245. Ibid § 13304(a). Violations of this provision are enforceable by the State Board or a regional board issuing a cleanup and abatement order.
246. Ibid § 13260; monetary penalties apply to violations: ibid § 13261.
247. Ibid §§ 13241, 13263.
248. Ibid § 13369(a)(1).
249. Ibid § 13369(a)(2)(A).

the plan.[250] With respect to reporting, the PCA requires the State Board to submit to the legislature reports required under the CWA and CZMA in relation to nonpoint pollution.[251]

The key document that fulfils this requirement is the voluminous Nonpoint Source Program Strategy and Implementation Plan 1998-2013 ('PROSIP') and the California Management Measures for Polluted Runoff ('CAMMPR'), which sets out 61 BMPs for six categories of nonpoint sources.[252] An example of a current BMP for agriculture is developing, implementing, and periodically updating nutrient management plans. These are to be implemented by various agencies, for example through local government land use plans and through the technical assistance program of resource conservation districts, which fulfil a similar function to catchment management authorities in Australia.

In some ways, the implementation of the PCA has not lived up to its potential. The implementation of the last phase of PROSIP was expected to start in 2008, but as of December 2011 the plan for this phase is not yet available.[253] Also, the possibility of granting waivers with few performance conditions to agricultural nonpoint polluters has historically been irresistible, and in many Californian regions this is still the case.[254] Traditionally, the only conditions of waiver programs were participation in cooperative monitoring programs, under which independent third parties indirectly measured pollutants in farm runoff through stream monitoring, and perhaps preparing, on a voluntary basis, a farm water quality management plan. This system accomplished little – it did not influence farm practices, given the absence of farm-specific monitoring and therefore individual farm responsibility. Nor did the system provide information on which farm management methods worked and which did not, or set timelines for compliance.[255]

Yet, for one thing, impressive institutional arrangements are at play. Twenty-eight state agencies with powers relevant to water quality collaborate through regular meetings, as the Interagency Coordinating Committee, to develop implementation plans and promote statewide consistency in nonpoint source programs.[256] The

250. Ibid § 13369(a)(2)(B).
251. Ibid § 13369(b).
252. BMPs are also accessible through an online database: State Water Resources Control Board (California), *MP Miner* <http://69.77 187.33/mpminer>. The database provides detailed information in relation to the effectiveness, cost, and scientific justifiability of each BMP.
253. California Coastal Commission, *Water Quality Program Statewide Nonpoint Source (NPS) Program Information* (2009).
254. See the repeated mention of these waivers in: State Water Resources Control Board (California) and Regional Water Quality Control Boards (California), *California Water Boards 2009 Accomplishments Report* (2010).
255. See, eg, Central Coast Regional Water Quality Control Board (California), *Preliminary Draft Staff Recommendations for an Agricultural Order· Conditionally Waiving Individual Waste Discharge Requirements for Discharges from Irrigated Lands* (2010) 6–7.
256. State Water Resources Control Board (California) & California Coastal Commission, *State of California Nonpoint Source Program Five-Year Implementation Plan July 2003 through June 2008* (2003) 7.

apparent strength of this arrangement is shown in the way that each BMP in the CAMMPR refers to implementation by multiple agencies in ways that seem to reinforce and increase the effectiveness of the relevant actions.

Much more stringent control of nonpoint agricultural pollution is also on the way, spearheaded by the Central Coast Water Quality Control Board ('the Board'). The Board's existing *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands* (Current Agricultural Waiver) will terminate in September 2012,[257] and the Board is developing a much more stringent replacement waiver program, garnering nationwide attention. Like the CWA treatment of MS4s, this initiative demonstrates enforceable regulatory instruments for nonpoint pollution.

(a) The Central Coast Water Quality Control Board example

The Salinas Valley in the Central Coast area of California is one of the largest farming regions in the US.[258] The region faces 'severe water quality impairment' in 'most' surface waters and 'many' groundwater bodies in the region, caused by nitrate-laden runoff from agricultural fertilizer use, and pesticides, nutrients and sediments, also from agriculture.[259] It is also home to 'some of the most significant biodiversity of any temperate region in the world'.[260]

After almost 18 months of consultations, in April 2010, the Board released its Preliminary Draft Agricultural Order ('Draft Order') as the first step to replacing the Current Agricultural Waiver, to the great interest of water quality managers around the US. The Draft Order sets out a battery of measures that hint at the potential effectiveness of the future final Order. It applies both performance and design standards and, most importantly, it provides for particularised responsibility. Farmers *must*: prepare farm water quality management plans; eliminate or control and treat non-storm water discharges; undertake individual source and watershed monitoring to demonstrate compliance with targets; and report to the Board their monitoring data and management practices.[261]

Softening the impact of these requirements, the Draft Order provides for flexible compliance mechanisms, and reduced requirements for agricultural discharges assessed as low-risk.[262] The timeline for compliance also introduces flexibility – irrigation discharges must be controlled in relation to various pollutants by between two years and four years from the date of the final Order.[263]

257. Central Coast Regional Water Quality Control Board, *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands* (4 Oct 2011) Agricultural Regulatory Program: <http://www.swrcb.ca.gov/rwqcb3water_issues/programs/ag_waivers>.
258. 'Agriculture Likely to Oppose Strict New California Farm Runoff Rules' (2010) 19(8) *Water Policy Report*.
259. Central Coast Regional Water Quality Control Board (California), above n 255, 11, 13.
260. Ibid 4–5.
261. Ibid 20–5.
262. Ibid 20.
263. Ibid 25.

The Draft Order is a preliminary document, with the final Order to be made in March 2012.[264] With factors such as sufficient funding and ongoing political will always at issue in nonpoint pollution control, this development will be one to watch closely.

6. SUMMARY OF US APPROACHES AGAINST THE AUSTRALIAN CONTEXT, AND A RESEARCH AGENDA FOR THE FUTURE

After recapping the key US approaches to controlling nonpoint pollution, this Part analyses the factors which are common to these success stories, or which otherwise appear outstanding. It then reflects on the paths these experiences illuminate for further research in this area, with a particular focus on management standards and management-based regulation, and with reference to strategies suggested by more recent regulatory work on experimentalist governance.

Parts 3 to 5 have drawn out detailed elements of the CWA, CZMA and PCA, and examples of their implementation, which address some of the gaps and weaknesses in current Australian approaches to nonpoint pollution. These gaps and weaknesses relate to enforceable regulatory instruments, market-based economic instruments, self-regulatory schemes, and performance standards. Enforceable regulatory instruments appear in the CWA and PCA and their implementation in the form of NPDES area-wide permits for MS4s; the Lake Tahoe and San Joaquin Valley examples of pursuing TMDLs; and the Draft Order for irrigated agriculture in the Salinas Valley. Market-based instruments for nonpoint sources introduce flexibility for compliance with the Lake Tahoe Lake Clarity Crediting Program and the Grassland Area Farmers Tradable Loads Program, and allow further point source development in the Minnesota River Basin. The Tampa Bay Estuary Program shows how private parties can voluntarily enter into legally binding agreements to reduce their nonpoint pollution. Performance standards are applied through programs to implement TMDLs, the Tampa Bay Estuary Program's Nitrogen Management Strategy, and some elements of the Central Coast Water Quality Control Board's Draft Order. Section 319 Nonpoint Source Management Programs, described only briefly here, include all of these approaches.

US commentators frequently judge nonpoint pollution laws in the US, particularly the CWA, to be significantly flawed.[265] They assess that the CWA has created 'a patchwork of state and local control programs, many of which are voluntary or poorly enforced'.[266] This study suggests that the CWA's provisions for nonpoint

264. Central Coast Regional Water Quality Control Board (California), *Agricultural Regulatory Program* (2009).

265. See, eg, RW Adler, 'Resilience, Restoration, and Sustainability: Revisiting the Fundamental Principles of the Clean Water Act' (2010) 32 *Washington University Journal of Law and Policy* 139, 141; Flatt, above n 127, 597.

266. Adler, ibid 161.

pollution have produced notable success stories, if not uniformly effective outcomes, and that the CZMA adopts a significantly improved approach. Several factors seem key to these CWA successes, and critical for the rigor of the CZMA. They are: goal-setting which includes nonpoint sources, broad stakeholder participation, good information, an ecological focus, and requiring 'proof of concept' for management plans to be approved.

Explicitly including nonpoint loads in TMDLs opens the door to methods of reducing pollution that use relationships between point sources covered by NPDES permits and nonpoint sources, such as point-nonpoint source trading in the Minnesota River Basin. Successful section 319 programs and the NEP both seem to embrace and benefit from broad stakeholder participation, which the NEP provision mandates. The Tampa Bay NEP, the Lake Tahoe case and, to some extent, the San Joaquin Valley example demonstrate that good information can make allocating pollution reduction requirements to nonpoint sources both possible and locally acceptable. The ecological focus of the NEP stands out from the other water quality approaches described and has led to significant ecological recovery, as shown in Tampa Bay. Finally, requiring planners rigorously to prove, up-front, that a plan is likely successfully to be implemented is the stand-out innovation of the CZMA.

Researchers could usefully explore the utility of each of these factors empirically. Stakeholder participation, information, and an ecological focus are already highly valued in Australia, as shown by Part 2.2. In the US context, some preliminary empirical research on the NEP has concentrated on the value of broad-based collaboration between stakeholders in formulating and implementing plans. This research could be extended to section 319 programs and coastal nonpoint programs, to determine whether broader and deeper stakeholder involvement leads to better nonpoint pollution outcomes. If such a connection were found, water quality could be improved by requiring broad participation by making simple statutory amendments or changing the funding criteria used in grant programs.

More generally, plan-based approaches (in other words, management-based regulatory styles) are a very strong theme of US regulation for controlling nonpoint sources. This theme is evident in the CWA through the 'continuing planning processes' for implementing TMDLs, section 319 programs and the NEP. It appears in the CZMA through coastal nonpoint programs, and in the PCA through basin plans. This approach is also embraced in Australia, for example through regional NRM plans under the NAP, Water Quality Improvement Plans, and the water quality and salinity management plan and water resource plans under the Water Act. The strength of the approach in both nations warrants further elaborating on specific future research paths.

Future research should assess empirically the effectiveness of three design elements, which management-based regulatory theory suggests are important

to outcomes,[267] and which this study indicates vary markedly in the nonpoint pollution context. The first design issue goes to what this paper has described as the superstructure of pollution regulation, namely, whether an upper-level government should mandate planning, implementation, or both, in relation to a lower-level government, and how it should do so. The Federal Government can mandate planning for TMDLs under the CWA, but cannot practically mandate implementation. It is unclear the extent to which this has prevented the CWA from being uniformly effective, as distinct from there being inherent problems with CWA programs themselves. Under the CZMA, the Federal Government mandates planning, but also requires proof that successful implementation is institutionally and legally likely, though it cannot enforce implementation. An alternative way of compelling implementation without requiring a federal enforcement apparatus would be to allow citizen suits, as has been argued in relation to the CWA.

A second design issue is to what degree of specificity regulations should set out plan requirements in terms of content and procedure. On the one hand, section 319 imposes very few specific requirements and imposes no minimum standards. On the other hand, the NEP and coastal nonpoint programs under the CZMA contain very detailed requirements as to procedure and the CZMA imposes minimum standards as to content, and requires 'proof of concept' before approval.

Finally, a question arises as to how best to monitor the implementation of plans. A recent empirical study of Australian NRM tools emphasised the importance of monitoring for both accountability and goal-setting, and the substantial challenge of establishing, maintaining, and using adequate monitoring systems.[268] A key variable is whether the scheme relies solely on government resources, as is usual, or whether it also uses third party monitoring as has occurred in California under the PCA, or third party auditors, as is occurring in the Minnesota River Basin in relation to nonpoint pollution trading. Introducing a citizen suit provision would be a further way to encourage third-party monitoring, consistent with the assumptions of management-based regulation. The influence of what entity carries out monitoring, and their characteristics (expertise, available resources, incentives to monitor well, etc), as well as how best to make trade-offs between stifling such organisations with bureaucratic requirements and ensuring accountability, are key issues that would benefit from research using the case studies identified in the paper, and others.

Accountability is a key theme running through these issues. An experimentalist governance framework would suggest that mechanisms for information sharing between management and government entities are worth of further research in the context of management-based approaches to nonpoint pollution management; that approach holds that such tools are a way of both increasing accountability

267. Coglianese & Lazer, above n 18, 706–19.
268. Holley, above n 27, 143–4.

while ensuring a high level of discretion, and also ensuring that local successes feed into higher level processes where they can be generalised and refined. Even if nonpoint source controls emphasise performance standards – which a pure experimentalist governance framework would reject on the basis that no actor had sufficient information to set such targets[269] – they could borrow from this structure a feedback loop between local successes as reported by states, and federal minimum standards for management plans, for example.

This paper has covered only the outstanding current features of US approaches to controlling nonpoint pollution which are most salient in the Australian context. This has involved some important omissions worthy of further research. Most importantly, as discussed in Part 3.1, the CWA deals with some types of nonpoint sources which have a lower profile in Australia but which are especially intractable, such as salt water intrusion and hydromodification. US approaches to dealing with these issues, though beyond the scope of the discussion in this paper, could very usefully inform Australian policy developments.

7. CONCLUSION

Based on the available literature, this study argues that current US approaches to controlling nonpoint pollution include the types of instruments which are presently either absent or weak in Australia – readily enforceable regulatory instruments, market-based economic instruments, self-regulatory schemes, and performance standards. These all occur within an overarching management-based framework that applies to federal-state relations. Management-based approaches are also common in Australian nonpoint source controls, albeit generally not at this superstructure level.

This paper also suggests that these approaches, as used in the US, deserve further empirical research in relation to factors that appear important to their success. Candidates for this research include: the use of water quality goals that explicitly include nonpoint sources in order to facilitate trading schemes; broad stakeholder participation and its empirical relationship to water quality outcomes; the role of good information in terms of both goal-setting and performance monitoring; the influence of goals that adopt a direct ecological focus as distinct from water quality parameters; and requiring 'proof of concept' for management plans. Finally, analysing how US approaches to management-based regulation vary between US nonpoint regimes has illuminated further future research paths useful to Australia, which also prefers this style of regulation in water management. Key areas of variation, the influence of which should be investigated, include: the extent to which planning and implementation are mandatory; the degree of specificity of requirements for management plans; how best to monitor the implementation of

269. Pires, above n 23, 6–7.

plans; and how best to incorporate an information feedback process from local successes to federal standards.

US scholars have noted that there is relatively little empirical work that focuses on 'the politics and implementation of, and barriers to effective [nonpoint] pollution regulation', compared to theoretical commentary.[270] Many useful research paths for Australia beckon from the US experiences briefly outlined in this paper. Empirical research on these experiences in the US as well as in Australia would provide invaluable guidance for Australia as it tackles the unfinished business of controlling nonpoint pollution.

270. Dowd, Press & Los Huertos, above n 18, 152, 155.