

## Sustainable management of the Lake Eyre Basin rivers – regulate, educate or open the gate?

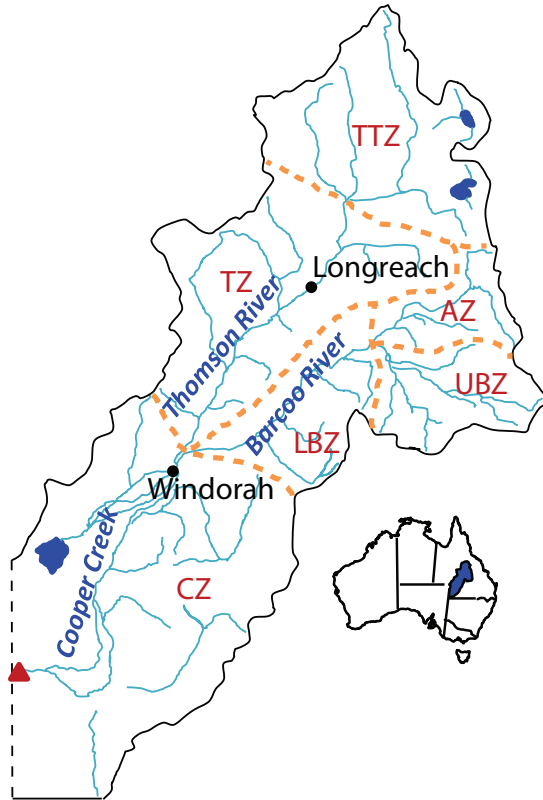
*Tom Crothers*

### Introduction

The Lake Eyre Basin covers about one-seventh of Australia, more than 1 million km<sup>2</sup> across Queensland, New South Wales, South Australia and the Northern Territory (see Chapter 1). It is of international and national environmental significance and includes areas of high economic, social and cultural heritage values. The significance of the Basin as an international and national asset is reflected in the Lake Eyre Basin Intergovernmental Agreement, established in 2001, to protect the rivers and related natural resources and signed by the Australian, Queensland, South Australia and the Northern Territory governments (see Chapter 7). The Lake Eyre Basin is one of the world's largest internally draining river basins, with many ecosystems, people and processes dependent on the rivers (Kingsford *et al.* 2014). Most of the water that flows into Lake Eyre originates in the upstream Georgina and Diamantina Rivers and Cooper Creek, two iconic dryland river systems with near natural and highly variable flow regimes (Puckridge 1999; Kingsford *et al.* 2014).

Cooper Creek flows beyond the Queensland border into South Australia, and covers an area of 296 000 km<sup>2</sup>, ~26% of the Lake Eyre Basin. It includes the Thomson, Barcoo and Cooper subcatchments in Queensland (Fig. 20.1). The major tributaries of Cooper Creek are the Barcoo, Thomson, Darr, Alice and Wilson Rivers, and Landsborough, Towerhill, Torrens and Kyabra Creeks. Cooper Creek forms a network of channels, waterholes, lakes and extensive floodplains, predominantly in the lower part of the catchment, known as the Channel Country. These wetlands and waterholes connect during floods, and progressively disconnect as the system dries, the predominant condition. Some waterholes are permanent, providing important refuges for waterbirds, fish, other animals and plants (Silcock 2009; Silcock 2010; Kerezsy *et al.* 2014; Kingsford *et al.* 2014). Cooper Creek has an extensive floodplain, south of Windorah, divided into two major sections, one in Queensland and the other in South Australia, separated by the 'Innamincka choke', a narrow channel and floodplain constricted by stony hills near the border. Above this, the Queensland floodplain can be up to 80 km wide, with flows connecting large swamps and the large temporary Lake Yamma Yamma. The South Australian section has numerous, widely distributed, shallow, ephemeral freshwater and saline lakes, intersected by parallel dunes.

The Georgina and Diamantina River catchments form the other iconic western river system flowing from Queensland to Kati Thanda-Lake Eyre (Fig. 20.2). Their catchments cover ~365 000 km<sup>2</sup>, ~32% of the Lake Eyre Basin. The Georgina River starts on the Barkly



**Fig. 20.1.** Queensland part of the Cooper Creek catchment of the Lake Eyre Basin, showing major rivers and creeks (blue), lakes (filled blue), towns and the Nappa Merrie flow gauge (triangle) and water planning zones (orange dashed lines): Alice Zone (AZ), Cooper Zone (CZ), Longreach Waterhole Relocation Zone (LBZ), Thomson Zone (TZ), Torrens Towerhill Zone (TTZ) and Upper Barcoo Zone (UBZ).

Tablelands of the Northern Territory before flowing through a complex system of rivers, creeks and floodplain wetlands. These include the Burke and Hamilton Rivers, near Boulia, and King Creek. The Georgina River becomes Eyre Creek immediately south of the confluence of the Eyre and King Creeks, some of the flow enters the short Cuttaburra Creek distributary which discharges water to Lake Machattie to the east and Lakes Mipia and Koolivoo to the west, while Eyre Creek continues westward through the Simpson Desert sandhills and then south, joining the Mulligan River and eventually turning east again to join the Diamantina River in Goyder's Lagoon (see Chapter 1). The combined Diamantina River and Eyre Creek flows can then move into Kati Thanda-Lake Eyre through the Warburton Creek outflow from Goyder's Lagoon. The Diamantina River's tributaries include the Western River, the Mayne River and Farrars Creek above Birdsville. The Hay River is a separate subcatchment on the western side of the Georgina–Diamantina Basin, rarely contributing flow to the Georgina–Diamantina Basin or Kati Thanda-Lake Eyre.

There is a long and ongoing history of pressure to develop the rivers of the Lake Eyre Basin (see Chapter 1). Initially, this primarily focused on pastoral development, followed by



**Fig. 20.2.** The floodplains of the Georgina and Diamantina Rivers are extensive, reliant on river flows from many different rivers: the Burke River, Hamilton River, Eyre Creek, King Creek, Mulligan River, Western River, Mayne River and Farrars Creek (photo, R. T. Kingsford). They can be particularly affected by upstream diversions for irrigation development, as well as petroleum and gas and mining exploration and development.

water resource development and mining. There is considerable potential for exploration and development of the Lake Eyre Basin's natural resources. Mineral tenements cover ~42.8% of the Queensland part of the Basin, including considerable focus on development of the eastern part for coal, particularly the Galilee Basin (see Chapter 19). The Lake Eyre Basin also has the most significant onshore petroleum resources in Australia, with 76% of the Queensland part of the Basin covered by petroleum tenements (Queensland Department of Natural Resources and Mines 2012). There are already existing commercial oil and conventional gas production tenements in the Eromanga part of the Basin. The Cooper geological basin is also the most productive and commercially viable shale gas region in Australia. The Georgina, Cooper and Galilee geological basins have potential for 'tight gas' resources. This natural gas is produced from rock strata with low permeability, requiring hydraulic fracturing to produce gas at economic rates. Coal seam gas exploration is already underway in the northern part of the Cooper Creek catchment. There are also uranium deposits in the northern section of the Georgina–Diamantina Basin. Many of these developments require water and their activities can interfere with surface and groundwater hydrology and dependent aquatic ecosystems.

Much of what is decided in Queensland on water policy and management ultimately determines the future of the Lake Eyre Basin river systems. I overview the legislative and

**Table 20.1.** Synopsis of the purpose and application of nine legislative instruments (Acts) underpinning Queensland’s regulatory frameworks in the Lake Eyre Basin, affecting environmental protection, natural resource management and custodianship of its rivers and groundwater systems.

Areas	Legislative instrument	Description	Status and relevance to the Lake Eyre Basin rivers
Environmental protection	<i>Water Act 2000</i> Qld <i>Water Legislation Amendment Act 2016</i> (Qld)	This regulatory framework provides for the allocation and management of Queensland’s water resources for consumptive purposes, with provisions for the management of environmental flows. However, the 2012–15 Liberal National Government’s <i>Water Reform and Other Legislative Amendment Bill 2014</i> changed the <i>Water Act</i> ’s purpose to ‘providing for the responsible and productive management, allocation and use of water, and balances social, economic and environmental values for the benefit of Queenslanders’. The principles of ecologically sustainable development were also removed from the legislation. The proclamation of a new <i>Water Act</i> was put on hold by the new Australian Labor Government in 2015. The <i>Water Legislation Amendment Act 2016</i> was implemented by the Labor Government (2015–present) election pledge to reinstate the principles of ecologically sustainable development to the purpose of the <i>Water Act 2000</i> .	This is the most important and powerful legislation for managing water resources in Queensland. It regulates the take of water from rivers and groundwater ecosystems, including effects on overland flows and trading of water entitlements. It has provided strong protection for natural flows of the Lake Eyre Basin rivers. The principles of ecologically sustainable development are now able to be applied to the management of the surface and groundwater resources of the Lake Eyre Basin.
	<i>Wild Rivers Act 2005</i> (Qld)	This Act provided protection for the natural intact values of rivers. It was also the first piece of legislation to place additional controls over resources industries (e.g. mining). It could not be overridden by the Queensland Coordinator- General, invoking the powers of the <i>State Development and Public Works Organisation Act 1971</i> for ‘coordinated projects’ or projects of State significance.	In 2010, the <i>Wild Rivers Act</i> was amended to include the preservation of the natural values of Lake Eyre Basin rivers in Queensland. In 2013, the Liberal National Government (2012–15) repealed the <i>Wild Rivers Act</i> and the Wild Rivers declarations for Cooper Creek and the Georgina and Diamantina Rivers were revoked in the passage of the <i>State Development and Infrastructure Planning (Red Tape Reduction) Act</i> on 5 August 2014.

Areas	Legislative instrument	Description	Status and relevance to the Lake Eyre Basin rivers
Environmental protection (continued)	<i>Regional Planning Interests Act 2014</i> (Qld)	This provided a new legislative framework for dealing with 'good quality agricultural land' and areas of environmental significance.	It defines a 'Strategic Environmental Area' (SEA) on either a map in a Regional Plan or as prescribed under a regulation. The 'Channel Country of western Queensland' is cited in the Act as an example of a Strategic Environmental Area. This Act allows for the resources industries to secure a 'Regional Interests Development Approval' (RIDA) for development in an SEA. It provides much weaker environmental protection than the repealed <i>Wild Rivers Act</i> .
	<i>Environmental Protection Act 1994</i> (Qld)	This legislation is for the protection of Queensland's environment, allowing development that improves current and future quality of life, while maintaining critical ecological processes. It promotes ecologically sustainable development. It specifies details and requirements for environmental impact statements and development approval conditions. An amendment in 2016 requires the impacts of a petroleum and gas or mining operations to be assessed as part of the granting of an environmental authority before granting tenure. New mining and petroleum and gas projects must apply for a tenement under this legislation.	Generally weak environmental legislation, unless there are major developments. It does not adequately deal with the cumulative impacts of development and small developments. It is not clear how well the new amendment will protect environmental values, including water.
	<i>Sustainable Planning Act 2009</i> (Qld) replaced by <i>Planning Act 2016</i> (Qld)	This legislative instrument aims to integrate planning and development assessment for ecologically sustainable development. It does not constrain the functions and powers of the Coordinator-General, under the <i>State Development and Public Works Organisation Act</i> , which allows the Coordinator-General to manage and 'fast track' environmental assessment of projects, designated as 'coordinated projects' or projects of state significance.	Reasonably weak coordinating legislation which may not effectively protect the environment. Amendments by the Liberal National Government (2012–15) refocused this legislation to allow development rather than managing the impacts of development on the environment. The development assessment provisions of the <i>Sustainable Planning Act 2009</i> were carried over. The new legislation is intended to regulate efficient and effective land use planning and development assessment, while achieving ecological sustainability.

Table 20.1. (continued)

Areas	Legislative instrument	Description	Status and relevance to the Lake Eyre Basin rivers
Environmental protection (continued)	<i>Vegetation Management Act 1999</i> (Qld)	This controls management of vegetation, regulating the clearing of remnant vegetation, identified as endangered, of concern or at least concern regional ecosystem. It also seeks to prevent the loss of biodiversity, maintain ecological processes and ensure that clearing does not cause land degradation.	The Liberal National Government (2012–15) passed amendments allowing the clearing of natural vegetation for new agricultural development; creating a self-assessment process for landholders to clear vegetation without a development permit; simplifying state-wide vegetation maps; and changing enforcement and compliance provisions. There is pressure from the environmental movement to reinstate provisions in the original vegetation management legislation. Efforts by the Labor Government (2015–present) to introduce improved protection of native vegetation were defeated in the Queensland Parliament.
	<i>Fisheries Act 1994</i>	This legislation regulates the management, use, development and protection of fisheries, including aquaculture and their habitats. It is underpinned by principles of ecologically sustainable development. It regulates construction of fishways which allow for fish movement over instream barriers (e.g. weirs).	This legislation is strong in protecting fish movement in rivers and dealing with any impacts that ‘in stream’ structures may impose on fish movement.
	<i>Mineral and Energy Resources (Common Provisions) Act 2014</i> (Qld)	The <i>Mineral and Energy Resources (Common Provisions) Act</i> was the first step to modernise Queensland’s resources Acts, standardising resources legislation in Queensland, establishing the objection and appeals process for the granting of environmental authorities for mining and, petroleum and gas tenures.	This legislation established that, where the Coordinator-General has included conditions in an environmental authority, these are final and objections cannot be lodged in the Land Court. This Act restricted the rights and grounds of objection to a mining lease to landowners of adjoining properties. It prevented third parties such as a local authority, community group or conservation organisation from lodging objections. These rights to object were reinstated by the Labor Government (2015–present) through the <i>Mineral and Other Legislation Amendment Bill 2016</i> . The Act also allows the Land Court to strike out frivolous or vexatious objections or those outside the court’s jurisdiction.

Areas	Legislative instrument	Description	Status and relevance to the Lake Eyre Basin rivers
Environmental protection (continued)	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth)	This Commonwealth legislation may be triggered when a development proposal could have significant impact on matters of national environmental significance. This includes Coongie Lakes in South Australia, a Ramsar-listed wetland.	This legislation has limited powers to deal with and control small cumulative developments or water planning processes.
Resource development	<i>Water Act 2000</i> (Qld)	This legislation focuses on sustainable management of water and other resources, through legal and policy frameworks, water resource plans and resource operations plans. These plans determine the allocation and management of water for consumptive purposes and may provide reserves of unallocated water for future development. It also establishes the responsibilities of water service providers, including Local Authorities.	This is the most important and powerful legislation, usually overriding most other legislative instruments in relation to the allocation and management of Queensland water resources.
	<i>Mineral Resources Act 1989</i> (Qld)	This legislation allows assessment for the development of mineral resources, consistent with sound economic and land use management. Any new mining project must apply for a mining tenement under the <i>Mineral Resources Act</i> . All environmental assessments and authorities for mines are dealt with under the <i>Environmental Protection Act</i> .	This is strong legislation which the Liberal National Government (2012–15) strengthened by granting a statutory right to take or interfere with underground water associated with mining operations, without a <i>Water Act</i> authorisation. Amendments made under the <i>Environmental Protection (Underground Water Management) and Other Legislation Amendment Act 2016</i> introduced an associated water licencing process to the <i>Water Act 2000</i> . This provided for more transparency and more of a focus on unacceptable environmental impacts, as well as process for objection by third parties. This process applies to petroleum and gas and mining operations.

Table 20.1. (continued)

Areas	Legislative instrument	Description	Status and relevance to the Lake Eyre Basin rivers
Resource development (continued)	<i>Petroleum and Gas (Production and Safety) Act 2004</i> (and the <i>Petroleum Act 1923</i> ) (Qld)	This Act assists safe and efficient exploration, development and transport of petroleum and fuel gas by pipeline. Development should be ecologically sustainable. It also controls water rights for petroleum tenures, allowing interference and unlimited take of water when drilling petroleum wells or observation bores. Petroleum tenure holders have to meet 'make good' provisions if their extraction of water impacts on landholder's bores. All environmental assessments and authorities for petroleum and gas wells are dealt with under the <i>Environmental Protection Act</i> but these activities are exempt from the <i>Sustainable Planning Act</i> and local authorities planning schemes.	This is strong legislation, outside the control of the statutory groundwater allocation and management plans. The petroleum and gas industries have a statutory right to take or interfere with underground water associated with their operations. For un-conventional gas industries (i.e. CSG and shale gas), the Queensland Government has adopted an 'adaptive management' approach, changing management frameworks, as risks are identified or impacts occur. Cumulative impacts of CSG operations are managed under a Cumulative Management Area framework in the Surat Basin.
Custodianship	<i>Aboriginal Cultural Heritage Act 2003</i> (Qld)	This Act controls the recognition, protection and conservation of Aboriginal cultural heritage, and is underpinned by respect for Aboriginal knowledge, culture and traditional practices.	While this legislation recognises Aboriginal cultural heritage, it lacks appropriate powers compared to other legislative instruments. Nothing in the Act makes the state liable to be prosecuted for an offence against Aboriginal cultural heritage values. It takes an 'all care and no responsibility' approach.
	<i>Land Act 1994</i> (Qld)	This legislation governs the administration and management of non-freehold land and land held under a deed of grant in trust. It also sets out and manages the process for creating freehold land. The Act embraces the principle of sustainable resource use and development and requires lessees of leasehold to demonstrate a 'duty of care' for the land during development.	This Act is moderately strong for use and management of leasehold lands, the predominant land tenure in Queensland's Lake Eyre Basin. Initiatives to link sustainable land management to leasehold lands during renewal and extensions (Delbessie agreements) were significantly rolled back by the Liberal National Government (2012–15).



water policy frameworks in Queensland that could protect these rivers and their unique landscapes from irreversible damage and destruction.

### Legislative and policy instruments relevant to water management in Queensland

There are currently nine relevant Queensland legislative instruments that impact on the use and management of natural resources in the Lake Eyre Basin (Table 20.1). These can potentially protect its rivers. They relate to environmental protection, resource access and custodianship of the resource. The *Water Act*, the *Wild Rivers Act* (now repealed), the *Regional Planning Interests Act*, the *Environmental Protection Act*, the *Sustainable Planning Act*, the *Vegetation Management Act*, the *Fisheries Act* and the *Mineral and Energy Resources (Common Provisions) Act* all affect environmental protection of the rivers of the Lake Eyre Basin in Queensland. They can all be overridden by the power of the Coordinator-General under the *State Development and Public Works Organisation Act* to promote development approvals under the provisions of ‘coordinated projects’ or ‘projects of State significance’.

Legislative instruments for resource access in Queensland include the *Water Act*, the *Mineral Resources Act* and the *Petroleum and Gas (Production and Safety) Act* (and the *Petroleum Act*). While the *Water Act* legislates the sustainable allocation and management of the Basin’s water resources, the *Mineral Resources Act* and the *Petroleum and Gas Act* can significantly and perversely affect the rivers and particularly groundwater resources, including the internationally iconic Great Artesian Basin. The *Aboriginal Cultural Heritage Act* and the *Land Act* promote custodianship of the cultural values of the water, but offer low-level protection to cultural heritage sites and values, and limited protection to the sustainable use and development of leasehold lands.

Many regulatory mechanisms can affect access and management of the rivers and groundwater systems in Queensland’s Lake Eyre Basin. Their effectiveness in environmental protection, particularly in constraining degrading natural resource development, depends considerably on the views and policies of the government of the time.

### Water regulation in the Lake Eyre Basin

In the mid-1990s, an entrepreneur proposed a large irrigated cotton development on two properties, adjacent to Cooper Creek and upstream of Windorah (see Chapter 1). This proposal was strongly rejected by the local community, the Australian public and scientists (see Chapter 17). The proposal was the catalyst for the development of the initial statutory water plans for the Georgina and Diamantina Rivers and the Cooper Creek, the dawn of a new approach to water resource regulation in the Lake Eyre Basin.

The first statutory water plan in the Lake Eyre Basin, the Water Resource Plan (WRP), was developed for Cooper Creek (approved 7/2/00), followed by the Georgina and Diamantina WRP (Queensland Department of Natural Resources and Mines 2004). These are implemented by resource operations plans (ROPs). The initial Cooper Creek water plan included a strategic and an operational focus and so a ROP was deemed unnecessary. All subsequent WRPs had accompanying ROPs. WRPs are based on the best available science, with extensive and transparent public consultation. They are required to be reviewed every

10 years, triggering finalisation of the second iteration of the Cooper Creek WRP (Queensland Department of Natural Resources and Mines 2011), followed by the Cooper Creek ROP (Queensland Department of Natural Resources and Mines 2013).

### Water access – river management plans

Regulations in WRPs and their accompanying ROPs include consideration of downstream impacts on communities and the river systems, but the devil is in the detail. The second generation Cooper Creek plans allowed transfer of all or part of the entitlement of original water licences issued for irrigation, within or between the Longreach Waterhole Relocation Zone and the Cooper Creek Zone (Fig. 20.1). These water licences can now be permanently traded and transferred (i.e. sold), if conditions on potential impacts are met. There is currently ~62 ha of irrigation, using an estimated 1000 ML each year. Water licences may also be upgraded to specify purpose, rate of take, daily volumetric pumping limit, annual volumetric limit of take, pumping thresholds and maximum storage limits. Importantly, pumping of water into large off-river storages for irrigation is not permitted, a critical protection measure (see Chapter 22). The maximum storage capacity allowable is 30 ML.

There is also opportunity to extract increased volumes of consumptive water from the river, including 700 ML (General Reserve), 200 ML (Indigenous Reserve) and 1300 ML (Strategic Reserve for projects of state significance): a total of 2200 ML of additional water extraction. Significantly, there is no additional water for expansion of irrigation in the Cooper Creek catchment. The Cooper Creek ROP (Queensland Department of Natural Resources and Mines 2013) allows up to 19 984 ML of water to be legally taken each year from Cooper Creek in Queensland. This includes unallocated water and 10 000 ML of existing ‘sleeper licences’ (currently not used). The Queensland Government has used a hydrological model to assess the potential impacts of water extraction on cross-border flows (see Chapter 2), using 118 years of simulated data at Nappa Merrie gauging station. If all allowable water were taken, an estimated 99.6% and 99.3% of the mean and the median annual flow respectively would still reach Nappa Merrie flow gauge on the border with South Australia. There are inevitable uncertainties in such models, which mean that not all of the environmental impacts can be measured (Ren and Kingsford 2011).

There is no equivalent hydrological model for the Georgina and Diamantina catchments. Instead, the Queensland Government has estimated the impacts of water extraction by using data from isolated stream gauging stations. The Queensland Government’s 2010–11 annual report on water plans for the Georgina and Diamantina Rivers (Queensland Water Commission 2011) identified that a total of 6108 ML (includes ‘sleeper licences’) could be taken each year for irrigation, with authorised licences with another 60 ML authorised for diversion to town water supply. There were unpublished government reports that ~250 ha of irrigation uses an estimated 4000 ML each year, with more than 6000 ML of water entitlement held in ‘sleeper licences’. The Georgina–Diamantina WRP identified that 1500 ML of unallocated water could be accessed for ‘Projects of State Significance’ and 12 000 ML could be accessed for any purpose (Queensland Department of Natural Resources and Mines 2004). There are restrictions for new water licences from significant waterholes

and wetlands listed in Attachment 5 of the Georgina–Diamantina ROP (Queensland Department of Natural Resources and Mines 2006a). Further, overland flow can also be harvested and stored for irrigation or town water supply, but not within listed protected watercourses (Section 108, Queensland Department of Natural Resources and Mines 2006a). The total take of overland flow is limited to 8800 ML (Category A) and 3200 ML (Category B), with limits for different management areas. The Georgina–Diamantina WRP (Queensland Department of Natural Resources and Mines 2006a) also stipulates that the Chief Executive of the water agency must consider the impacts on waterholes and wetlands and their connectivity in times of low flow. In total, 19 608 ML of water may be legally diverted each year. Currently, there is little interest in additional water for irrigation, with no take up of available reserves of unallocated water.

### **Water access – the Great Artesian Basin**

The Lake Eyre Basin also overlays much of the Great Artesian Basin (see Chapter 1). Its water was the essential lifeblood for the settlement and development of pastoral industries in western Queensland. In this region, water access is regulated by the WRP for the Great Artesian Basin (Queensland Department of Natural Resources and Mines 2006b) and its ROP (Queensland Department of Natural Resources and Mines 2007). The Queensland part of the Great Artesian Basin is split into 25 management areas, including 10 in the Lake Eyre Basin. Within the Cooper Creek WRP area, water can be used to irrigate up to 10 ha of land for fodder production and up to 2 ha for horticulture, allowing up to 3900 ML of water to be extracted (27 licences) each year to irrigate ~130 ha of land. There is another 9500 ML of unallocated water (General Reserve, including for irrigation) and up to 10 000 ML a year forms a State Reserve for special projects, which could also be diverted each year. Currently, only 937 ML of this unallocated water (the State Reserve) is accessed. The plan is currently under review, with a new draft plan released in January 2017 (Queensland Department of Natural Resources and Mines 2017). This draft plan changes the existing number of Management Areas and Units from 120 to 16 Groundwater Units and 91 Geological Formations. It will allow for all aquifers to be managed in their entirety. It will not manage the take of water from the Great Artesian Basin by the petroleum, gas and mining sectors. It also proposes to provide for 35 000 ML of additional unallocated water for new development: 80% of this water is State Reserve for major projects (gas, mining or geothermal power projects). The new plan also provides for the capping of all 189 remaining uncapped bores by 2017, although there will be discretionary powers for extensions or exemptions under special circumstances.

### **Wild Rivers declarations**

In 2009, the Queensland Labor Government announced that the natural values of the Lake Eyre Basin river systems would be protected by Wild Rivers declarations under the *Wild Rivers Act 2005* (Table 20.1). This announcement precipitated the convening of two science forums to assess natural values, hydrology and ecological processes of Lake Eyre Basin rivers. The forums and wide-ranging stakeholder consultations across the Queensland part of the basin shaped the detailed amendments to the Wild Rivers legislation, affecting Lake Eyre



**Fig. 20.3.** The boom in food and nutrients provided by floods is critical to the animals, including waterbirds, plants and other organisms of the rivers of the Lake Eyre Basin. Protection of these floods is critical to the future viability of the unique rivers of the Lake Eyre Basin, the people and environments that depend on them (photo, A. Emmott).

Basin rivers. The *Wild Rivers Act* was amended in 2010 to restrict development on the floodplains of Queensland's Lake Eyre Basin river systems. Wild Rivers declarations were subsequently approved for the Cooper Creek and the Georgina and Diamantina Wild Rivers (16 December 2011), imposing specific statutory measures to protect five key factors: hydrological processes, geomorphic processes, riparian function, wildlife corridor function, and water quality (Fig. 20.3). As well, parts of the rivers were spatially identified on maps as High Preservation Areas (HPAs) and Special Floodplain Management Areas (SFMAs), requiring special management. The declarations and specific statutory measures protected Cooper Creek and the Georgina and Diamantina Rivers, from their headwaters to the South Australian border.

Other controls regulated removal of quarry materials and forest products; taking or interfering with water in a watercourse, lake or spring, or floodplain (overland flow); and construction of in-stream structures. There were also controls on aquaculture, agriculture and animal husbandry and restrictions on the clearing of native vegetation. The declarations also prohibited surface mining in designated areas. In addition, they regulated 'setback' distances for certain works and operations, controlled under the *Transport Infrastructure, Mineral Resources, Petroleum and Gas* and *Petroleum* Acts (Table 20.1). The declarations also specified requirements for environment impact statements and environmental management with development approval. These controls did not apply to existing activities or works, or residential, commercial or industrial development in urban areas.

Wild Rivers declarations had the 'head of power' to significantly constrain exploration and development by the mining and gas industries where impacts to rivers and river systems were likely. These industries constantly lobbied Queensland governments to remove these development constraints by repealing the *Wild Rivers Act* and revoking Wild Rivers declarations, arguing that they made investment uncertain (Queensland Resources Council 2010). The Liberal National Party Government (2012–15) amended the legislation, allowing increases in the size of workforce accommodation, the size for multi-well sites, fuel storage

capacity, compression facilities and pipelines within HPAs and SFMAs, arguing that it improved safety for remote workers and improved efficiency of the petroleum and gas industry. The Labor Government (elected in 2015) made an election commitment to reinstate the protective provisions of the Wild Rivers legislation to the rivers and ecosystems of the Queensland part of the Lake Eyre Basin but there is no progress on this commitment.

### **The 2012–15 political regime of the Liberal National Party**

During the 2012 Queensland election campaign, the Liberal National Party foreshadowed revocation of all Wild Rivers declarations in Queensland. Once in government, Premier Newman appointed the Honourable Andrew Cripps as Minister for Natural Resources and Mines, directing him to find alternative strategies to protect Western Rivers, while allowing sustainable development (Western Rivers Advisory Panel 2013). Minister Cripps established the Western Rivers Advisory Panel (WRAP), representing local government, AgForce (the peak agricultural stakeholder group in Queensland), the resources sector, an Indigenous representative, a scientific representative from the Lake Eyre Basin Scientific Panel, and natural resource management groups including the Cooper Creek Catchment Committee, the Georgina/Diamantina Catchment Committee and Desert Channels Queensland, the natural resource management group (Western Rivers Advisory Panel 2013).

Minister Cripps proclaimed at the first Western Rivers Advisory Panel meeting that he would replace the Lake Eyre Basin Wild Rivers declarations with alternative strategies for river protection. The Western Rivers Advisory Panel was asked to provide advice on the important natural values of the Lake Eyre Basin and the option for expanding ‘small scale’ irrigation. The Queensland Department of Natural Resources and Mines surveyed Western Rivers Advisory Panel members about these values and assets, the focus and level of their protection and the greatest threats to the health and sustainability of the region’s rivers. The highest 10 assets or values were: a weed- and pest-free environment; access to groundwater; maintenance of natural flows; groundwater quality; protection of wetlands and lakes; protection of artesian springs; health of aquatic fauna, health of riparian terrestrial fauna, health of native pastures; and surface water quality (Western Rivers Advisory Panel 2013).

Western Rivers Advisory Panel members ranked developments most likely to affect the rivers’ ecological sustainability. Invasive species were ranked first, then large-scale mining, followed by unconventional petroleum and gas extraction, out of 33 types of development (Western Rivers Advisory Panel 2013). Irrigated agriculture ranked sixth and conventional petroleum and gas extraction ranked eighth. These rankings were consistent with similar results from the members’ survey done by AgForce (AgForce, unpublished survey, January 2013). It was ironic that those high value assets, identified as most needing protection from ‘high concern development activities’, were well protected under the agreed water plans and Wild Rivers declarations.

The government agency also consulted Western Rivers Advisory Panel members on the scale of ‘small scale irrigation’ appropriate for the rivers, given the directive from the government. There was no consensus, with stakeholders ranging from an irrigated area of 10 ha (160 ML/year water entitlement) to 100 ha for a commercial operation (1600 ML/year water entitlement). A ‘no irrigation’ option was not provided. Surprisingly, Ag Force advised

**Table 20.2.** Issues regulated by specific protection measures within the *Wild Rivers Act 2005* which protected the values of the Lake Eyre Basin rivers and their floodplains from deleterious developments, and consequences following revocation of this legislation.

Issues or development threats	Wild Rivers declaration protection measures	Consequences of revocation
Mining and petroleum and gas exploration and development	Special Floodplain Management Areas (SFMA) and High Preservation Areas (HPAs)	Potentially high-impact mining and petroleum & gas exploration and development is no longer prohibited or regulated along the rivers or adjacent floodplains. This could result in: <ul style="list-style-type: none"> <li>• interference with overland flow water and beneficial flooding on floodplains</li> <li>• reduced controls on open cut mining, including mining of 'sensitive areas' of rivers</li> <li>• mining exploration and development having access to secure water supplies for operations outside of the water management framework</li> <li>• water supplies required for mining being met from surface water in the rivers or through access to groundwater, such as the Great Artesian Basin. This could compromise the Commonwealth, state and landholder's investment in the Great Artesian Basin Sustainability Initiative.</li> </ul>
Expansion of irrigation		The Cooper Creek water plans have been amended to allow for existing water authorisations to be transferred and traded, subject to some conditions on volumes traded.
Overland flows and floodplain connectivity		The alteration of overland flows on the floodplains is no longer regulated and this could result in changes to flow patterns of beneficial flooding of the Channel Country.
Instream structures		No prohibition on the construction of instream structures (weirs and dams) affecting flows. These structures were prohibited under a Wild Rivers declaration, whereas the <i>Water Act</i> manages the take of water for weirs and dams and the <i>Sustainable Planning Act</i> manages the assessment and approval process for these works.
New cropping and irrigation development		Any new irrigation and cropping developments are not excluded from floodplain areas adjacent to the major rivers. These developments can affect natural overland flow waters and beneficial flooding to downstream landholders.
Feedlots		Small-scale feedlots will no longer be prohibited in key parts of the riverine area, including those areas that experience overland flooding. Levees to protect these areas may divert water flows and impact on beneficial flooding downstream.
All developments		Riverine protection permits for any potential developments are not required to comply with the Wild Rivers Code provisions to protect the values of the river. Landholder's aspirations of a 'rigid regulation of the resources industry' will not be able to be delivered.

that the government should regulate feedlots, dryland cropping, small- and large-scale irrigation, vegetation clearing and timber harvesting, but not livestock grazing, road or fence construction, fodder harvesting or vegetation thinning. There was a strong desire to prohibit ‘large scale irrigation’, with most AgForce constituents also strongly supporting regulation of mining exploration and development on the floodplains and in watercourses. Support for regulation of agriculture away from watercourses and on the adjoining floodplains was significantly lower. Paradoxically, some respondents also called for the removal or replacement of the *Wild Rivers Act*, because it was not sympathetic to people living on these rivers, even though this was clearly the most effective legislative instrument to protect the values and control the threats of most concern to AgForce members.

The Liberal National Party Government (2012–15) revoked the Wild Rivers declarations for Cooper Creek and the Georgina and Diamantina Rivers with the *State Development and Infrastructure Planning (Red Tape Reduction) Act* (5 August 2014; Table 20.1). Expansion of ‘small scale’ irrigation was also encouraged by amending the Cooper Creek Resource Operations Plan at the last minute, to allow trade and transfer of the large ‘sleepier entitlements’ near Windorah (Fig. 20.1). There were clear legislative, policy and management consequences affecting the values of the Lake Eyre Basin rivers. The highly effective framework for protecting Queensland’s Lake Eyre Basin rivers and regulation of development were removed, replaced by currently ineffectual legislation. High-impact surface mining and petroleum and gas activities would not be prohibited or regulated along the rivers, including in the Channel Country (Table 20.2).

Further, expansion of petroleum and gas industries was promoted into the Channel Country, through the release of the Cooper Basin Industry Development Strategy (Queensland Department of Natural Resources and Mines 2015). This strategy proposed accelerated development of the deep gas and oil industry, as well as the development of a Cooper Basin Water Strategy to stimulate deep gas extraction (‘fracking’).

### **The future – regulate, educate or open the gate?**

Governments will need to meet community expectations in Australia and internationally, for the protection of the Lake Eyre Basin’s natural and cultural values. However, there are clear inequities. Many agricultural people want to reduce regulations on their industry, but insist that the mining, petroleum and gas industries be rigidly regulated. This contradicts principles of natural justice, procedural fairness and equitable application of legislative provisions where regulation is required in the public interest. It is also not sufficient to argue that ‘small scale’ irrigation can occur without considering the ramifications (see Chapter 22). History has shown that without appropriate control and protection, many of Australia’s irrigation areas have significantly affected the ecological health of rivers. Many started as ‘small scale’ property drought-proofing schemes, ratcheting up into major irrigation areas taking considerable quantities of water river and groundwater reserves (see Chapters 14 and 15). This has had a considerable impact on the long-term health of riverine ecosystems (Kingsford 2000; Arthington and Pusey 2003; Bino *et al.* 2016), the integrity of natural flows on floodplains and many of the communities

dependent on these flows. It would be a tragedy to see history repeated on the Lake Eyre Basin's rivers.

Protection of the Lake Eyre Basin's rivers and their floodplains, including their natural and cultural values, requires reinstatement of statutory controls to protect the natural river processes from inappropriate development, through either the *Wild Rivers Act*, an amendment of the *Environmental Protection Act* or *Water Act*. Or there could be separate legislation, such as a *Lake Eyre Basin – Natural Rivers Management Act*, with similar protection measures. The future protective framework for the Lake Eyre Basin rivers should retain the most important protective measures of the Wild Rivers legislation for 'sensitive areas', such as HPAs and SFMAs. For the water legislation, a reduction in trading options for the current 'sleeper licences' in the Basin's rivers would also protect the river's values (see Chapter 22). It is critical that pumping thresholds and the 'no storage' provision be retained for all water licences so that large amounts of water cannot be diverted during high river flows. Given current low interest in purchasing existing unallocated water for 'small scale' irrigation, the water plans in the catchments should not be reviewed or altered until all existing entitlements and reserves of water are fully utilised or potentially the current unused entitlements are extinguished through a 'buy back' process (see Chapter 22).

Predicted end-of-system flow percentages for Cooper Creek (99.6% of mean annual flow and 99.3% of median annual flow) are some of the best in Queensland but they would be expected to decrease with additional water extraction, if 'small scale' irrigation or mining took more water. Reductions on the extent and frequency of flooding of the Channel Country from mid and high flows would be inevitable.

## Conclusion

Future Queensland governments may have different views and change the policies of their predecessors in the future protection and management of the rivers and wetlands of the Lake Eyre Basin. The arguments over water resource development will probably wax and wane with the changing political will and agendas. However, there remains a strong coalition of landholders, scientists, Traditional Owners and many other educated and connected community members, within and outside the Basin, committed to the protection of these rivers (see Chapter 7) and their dynamic ecology. Protection and regulation of rivers by governments to deliver on the community's expectations is critical. Considerable long-term ecological degradation and social impacts can occur if governments 'open the gate' to further development of the Lake Eyre Basin's rivers or exploitation of its groundwater, particularly when existing regulations on protecting sensitive areas are removed or new regulations are not sufficiently powerful to constrain resource exploitation that damages the environment. Future generations will judge decision-makers harshly if they fail to adequately protect these unique rivers.

## References

- Arthington AH, Pusey BJ (2003) Flow restoration and protection in Australian rivers. *River Research and Applications* **19**, 377–395. doi:10.1002/rra.745
- Bino G, Kingsford RT, Brandis K (2016) Australia's wetlands: learning from the past to manage for the future. *Pacific Conservation Biology* **22**, 116–129. doi:10.1071/PC15047



- Kerezsy A, Arthington AH, Balcombe SR (2014) Fish distribution in far western Queensland, Australia: the importance of habitat, connectivity and natural flows. *Diversity (Basel)* **6**, 380–395. doi:10.3390/d6020380
- Kingsford RT (2000) Review: Ecological impacts of dams, water diversions and river management on floodplain wetlands in Australia. *Austral Ecology* **25**, 109–127. doi:10.1046/j.1442-9993.2000.01036.x
- Kingsford RT, Costelloe J, Sheldon F (2014) Lake Eyre Basin – challenges for managing the world’s most variable river system. In *River Basin Management in the Twenty-first Century*. (Eds VR Squires, HM Milner and KA Daniell) pp. 346–367. CRC Press, Boca Raton.
- Puckridge JT (1999) The role of hydrology in the ecology of Cooper Creek, Central Australia: implications for the flood pulse concept. PhD thesis. The University of Adelaide, Australia.
- Queensland Department of Natural Resources and Mines (2007) *Great Artesian Basin Resource Operation Plan*. Queensland Department of Natural Resources and Mines, Brisbane, <[https://www.dnrm.qld.gov.au/\\_\\_data/assets/pdf\\_file/0011/106031/gab-rop.pdf](https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0011/106031/gab-rop.pdf)>.
- Queensland Department of Natural Resources and Mines (2004) *Water Plan (Georgina and Diamantina) 2004*. Queensland Department of Natural Resources and Mines, Brisbane, <<http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WaterReGeP04.pdf>>.
- Queensland Department of Natural Resources and Mines (2006a) *Georgina and Diamantina Resource Operations Plan*. Queensland Department of Natural Resources and Mines, Brisbane, <[https://www.dnrm.qld.gov.au/\\_\\_data/assets/pdf\\_file/0016/106045/gd-rop.pdf](https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0016/106045/gd-rop.pdf)>.
- Queensland Department of Natural Resources and Mines (2006b) *Water Resource (Great Artesian Basin) Plan 2006*. Queensland Department of Natural Resources and Mines, Brisbane, <<https://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WaterReGABP06.pdf>>.
- Queensland Department of Natural Resources and Mines (2011) *Water Plan (Cooper Creek) 2011*. Queensland Department of Natural Resources and Mines, Brisbane, <<http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WaterReCCPI11.pdf>>.
- Queensland Department of Natural Resources and Mines (2012) ‘Queensland’s Western Rivers – the Lake Eyre Basin – an overview. Report to the Western Rivers Advisory Panel’. Department of Natural Resources and Mines, Brisbane.
- Queensland Department of Natural Resources and Mines (2013) *Cooper Creek Resource Operations Plan*. Queensland Department of Natural Resources and Mines, Brisbane, <[https://www.dnrm.qld.gov.au/\\_\\_data/assets/pdf\\_file/0006/110787/cooper-creek-resource-operations-plan.pdf](https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0006/110787/cooper-creek-resource-operations-plan.pdf)>.
- Queensland Department of Natural Resources and Mines (2015) *Resources Cooper Basin Industry Development Strategy*. Department of Natural Resources and Mines, Brisbane, <[https://www.dnrm.qld.gov.au/\\_\\_data/assets/pdf\\_file/0006/234825/cooper-basin-industry-strategy.pdf](https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0006/234825/cooper-basin-industry-strategy.pdf)>.
- Queensland Department of Natural Resources and Mines (2017) *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017*. Queensland Department of Natural Resources and Mines, Brisbane, <[https://www.dnrm.qld.gov.au/\\_\\_data/assets/pdf\\_file/0003/1039413/draft-gabora-water-plan.pdf](https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0003/1039413/draft-gabora-water-plan.pdf)>.
- Queensland Resources Council (2010) Cooper Creek Wild River proposal extends blanket of uncertainty. Media release, <[https://www.qrc.org.au/01\\_cms/details.asp?ID=2617](https://www.qrc.org.au/01_cms/details.asp?ID=2617)>.
- Queensland Water Commission (2011) ‘Annual report, 2010–2011’. Queensland Water Commission Brisbane, <[https://www.dews.qld.gov.au/\\_\\_data/assets/pdf\\_file/0016/31471/qwc-annual-report-1011.pdf](https://www.dews.qld.gov.au/__data/assets/pdf_file/0016/31471/qwc-annual-report-1011.pdf)>.
- Ren S, Kingsford R (2011) Statistically integrated flow and flood modelling compared to hydrologically integrated quantity and quality model for annual flows in the regulated Macquarie River in arid Australia. *Environmental Management* **48**, 177–188. doi:10.1007/s00267-011-9673-9
- Silcock J (2009) ‘Identification of permanent refuge waterbodies in the Cooper Creek and Georgina-Diamantina River catchments for Queensland and South Australia, Final report’. South Australian Arid Lands Board, Longreach.
- Silcock JL (2010) Experiencing waterholes in an arid environment, with particular reference to the Lake Eyre Basin, Australia: a review. *Geographical Research* **48**, 386–397. doi:10.1111/j.1745-5871.2010.00642.x
- Western Rivers Advisory Panel (2013) ‘Western Rivers Advisory Panel report’. Queensland Department of Natural Resources and Mines, Brisbane, <[https://www.dnrm.qld.gov.au/\\_\\_data/assets/pdf\\_file/0015/82500/wrap-report.pdf](https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0015/82500/wrap-report.pdf)>.