



OUT13/26255

Mr. Sebastian Roberts
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ACCC
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Dear Mr. Roberts

Review of State Water Corporation's Pricing Application to the Australian Competition and Consumer Commission for Regulated Charges from 1 July 2014

Background

Fisheries NSW is responsible for the management of fisheries resources within NSW including freshwater fish and aquatic invertebrate communities within the rivers and waterways of the Murray Darling Basin (MDB). This responsibility is provided through the NSW *Fisheries Management Act 1994* (FM Act) (specifically Parts 7 and 7A) which relate to conservation of aquatic habitat, maintenance and improvement of fish passage including provision of fishways in dams and weirs and listing, management and protection of threatened species of fish and aquatic invertebrates. At present, 6 species, 2 populations and 3 ecological communities of native MDB fish/aquatic invertebrates are listed as threatened under Part 7A. The Federal Government listing via the *Environment Protection and Biodiversity Conservation Act* (EPBC Act) includes an additional species (Murray Cod) that is not listed in NSW (see Appendix 1).

The regulation of water flows in MDB rivers and streams through the construction and operation of dams and weirs has contributed significantly to the documented decline in native freshwater fish communities. The Native Fish Strategy for the Murray Darling Basin estimated that the native fish community has been reduced by 90% from the time of European settlement. Similarly, the most recent assessment of fish communities in the MDB (MDBA 2012a) found that for the 23 valleys assessed, 20 had a Fish Condition Index rated as *poor, very poor or extremely poor*.

To address this impact, the "installation and operation of in-stream structures and other mechanisms that alter the natural flow regime of rivers and streams" has been listed as a "Key Threatening Process" (KTP) under the FM Act in recognition of the impacts of river regulation as a major threat to aquatic biodiversity and the survival and recovery of listed threatened fish species, populations and ecological communities.

Since 2002, State Water Corporation (State Water) has maintained a Memorandum of Understanding (MoU) with the NSW Department of Primary Industries (Fisheries NSW) under paragraph 2.3.1 of their Operating License for the purpose of forming a cooperative relationship to address these issues. Specifically, the MoU recognises the role of Fisheries NSW as the agency responsible for fisheries management in NSW and provides a format to address the impacts of State Water's operations on aquatic habitat and fish passage. State Water Corporation and Fisheries NSW renewed and updated the MoU in June 2012 for a further three years.

This letter is a formal submission from Fisheries NSW in response to State Water's pricing application to the Australian Competition and Consumer Commission (ACCC) for regulated charges from 1 July 2014. Fisheries NSW has reviewed State Water's submission and provides specific comment on two topics of significance to fisheries management in the MDB: fish passage and cold water pollution.

Fish Passage

The majority of native freshwater fish in the MDB undertake both short and long range migrations within river systems over the course of their lifecycles. Dams and weirs obstruct and block these movements with a range of adverse consequences for the fish community at both a local and regional scale. The Key Threatening Process "installation and operation of in-stream structures and other mechanisms that alter the natural flow regime of rivers and streams" specifically notes the impact of dams and weirs upon fish movement and migration, an impact that can be ameliorated to a large extent by including fishways at the structure. Part 7 of the FM Act includes a provision (s218 - Fishways to be provided in construction of dams and weirs) to enable fishways to be installed or retrofitted to dams and weirs when the structure is being constructed, altered or modified.

State Water manages 20 dams and over 280 weirs and regulators to deliver bulk water along 7000 kms of waterway across 12 NSW valleys. From time to time, State Water is required to construct, alter or modify these structures thereby triggering section 218 of the FM Act requiring notification of the Minister for Primary Industries, and if requested by the Minister, construction of a suitable fishway or fish by-pass.

Dam Safety Upgrades – Fishway Offsets

State Water is in various stages of completing Stage 1 Dam Safety Upgrades (DSU) at Copeton, Keepit, Split Rock, Chaffey, Burrendong, and Wyangala Dams to improve their capacity to withstand extreme flood and earthquake events and to follow guidelines established by the Australian National Committee on Large Dams, administered by the NSW Dam Safety Committee. Fisheries NSW previously assessed the DSU proposals between 2005 - 2009 with respect to s.218 and notified State Water that fishways were to be incorporated into the proposed DSU programs except for Chaffey Dam. This legislative requirement was recently reconfirmed by Fisheries NSW to State Water in a letter dated 9 May 2013 (see Attachment 1).

Initial cost estimates provided by State Water in 2009 to install high-level fishways at the five dam compliance sites totalled \$285M (Table 1). Given such costs, Fisheries NSW worked collaboratively with State Water in 2009 to complete a decision matrix prioritisation and consultation process that identified thirteen (13) high priority fishway offset sites in lieu of constructing high level fishways at the original dam compliance sites (Table 1). This course of action will save State Water and NSW irrigators over \$200M while producing a greater ecological benefit for native fish. Additionally, the fishway offsets meet all State Water requirements under s.218 of the FM Act in relation to the DSU sites listed above.

With this agreement in place, State Water submitted costs for the 2010 – 2014 Independent Pricing and Regulatory Tribunal (IPART) determination period of \$35.1M to develop concept and detailed designs for the 13 fishways and undertake construction at one to two fishways per valley. Costs submitted by State Water for the 2010 – 2014 IPART determination period did not cover the full costs of constructing all 13 fishways.

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IPART commissioned WS Atkins International Ltd & Cardno Pty to review the capital (CAPEX) and operating (OPEX) expenditure presented in State Water's 2010-2014 submission. Their report to IPART noted "The negotiation of providing fish passage at offset locations is considered prudent when one compares the cost of providing fish passage at Keepit versus the cost of providing fish passages at the three (offset) weirs. The scheme is prudent when considered in isolation; there is a legislative requirement for these works to be undertaken. (Atkins Cardno 2009)." Following this advice, IPART approved \$31.25M for the 2010 – 2014 determination period for the partial completion of DSU Fishway Offsets Program (Table 1).

Concept fishway designs were finalised for all 13 fishways by the 2011/12 financial year, with the DSU Fishway Offsets Program estimated to cost \$69.7M. Detailed fishway designs have subsequently been completed for Mollee, Gunidgera, Tyreel Weir, Tyreel Regulator, Marebone Break, and Gunningbar Weirs; with fishway construction started at Mollee Weir and tenders released for Tyreel Regulator and Marebone Break. A vertical slot fishway was originally proposed at Weeta Weir (Keepit / Split Rock Dam offset) at an estimated cost of \$4.8M; however, the weir was determined to be redundant to State Water requirements and was removed for approximately \$300 K in May 2013 with savings of approximately \$4.5M. Removal of Weeta Weir resulted in the works being classified as OPEX rather than CAPEX.

State Water provided Fisheries NSW with revised estimates in 2013 that the DSU Fishway Offsets Program would approximate \$77.3M (Table 1), and subsequently have included costs of \$47.85M for the DSU Fishway Offsets Program in their 2014 – 2017 ACCC submission (Reference Table 7.6, pg. 82). Actual costs of the fishways cannot be fully defined until final designs are completed and tenders submitted to complete the works; therefore suitable contingency estimates are required when calculating final costs for the DSU Fishway Offsets Program. Fisheries NSW is unclear as to what portion of the IPART 2010 – 2014 funding for DSU Fishway Offsets has been spent, what is the remaining funding required to complete the DSU Fishway Offsets Program, and whether the remaining funding equates to State Water's funding request (\$47.85M) from the ACCC.

Fisheries NSW notes that the DSU Fishway Offset costs are listed in the ACCC submission under Environmental Planning and Protection Works; however, the fishways are a legislative requirement resulting from dam safety compliance activities which are treated by State Water as a separate capital expenditure item in their ACCC submission. As the original DSU Fishway Offset sites were discussed and agreed to with State Water in 2009, Fisheries NSW requests that funding allocated by the ACCC for the 2014 – 2017 determination period be sufficient to complete detailed designs and fishway construction at the remaining 12 fishway sites to meet State Water's legislative requirement under s.218 of the FM Act.

Fisheries NSW wishes to make a special comment with regards to weir removal. Weir removal is unequivocally the best option for improving fish passage at weirs that are deemed operationally redundant by State Water. In addition to reinstating unimpeded fish passage to all native fish, weir removal results in (1) significantly lower expenditure as exemplified at Weeta Weir, (2) no ongoing weir and fishway maintenance, and (3) no monitoring requirement to validate fishway operational effectiveness. The primary issue that has handicapped further discussions with State Water regarding weir removal as a suitable DSU offset option is that the activity is classified as OPEX rather than CAPEX. Fisheries NSW strongly requests consideration be given to increasing funding allocated to State Water for OPEX so that weir removal projects can be pursued reducing the total expenditure on DSU Fishway Offsets Program.

Dam Safety Upgrades

State Water proposes dam safety investigations / works at Keepit, Wyangala, Rydal, and Oberon Dams as well as Menindee Lakes during the 2014 – 2016 ACCC determination period. As stated above, Fisheries NSW has assessed s.218 requirements under the FM Act at Keepit and Wyangala Dams and no further reassessment is required for DSU works proposed at these two sites as part of this submission. State Water has yet to notify Fisheries NSW of proposed works at Rydal Dam, Oberon Dam, and Menindee Lakes. If the works involve construction, alteration, or modification of the dam or weir, State Water is required to notify the Minister for Primary Industries, and if requested by the Minister, construct a suitable fishway or fish by-pass.

TABLE 1: State Water Dam Safety Upgrade (DSU) Fishway Offsets Program

DSU PROGRAM SITES	HIGH LEVEL FISHWAY ESTIMATES (2009)	SWC IPART REQUEST (2009)	IPART FUNDING (2009)	CONCEPT DESIGN ESTIMATE	SWC ESTIMATES (2013)	SWC ACCC REQUEST (2013)	COMMENT
Keepit / Split Rock	\$85 M	\$18.0 M	\$15.6 M	\$19.0 M	\$18.2 M	\$4.0 M	
Mollee Weir			X	\$7.0 M	\$8.9 M		Lock fishway
Gunidgeera Weir				\$7.2 M	\$8.9 M	X	Lock fishway
Weeta Weir			X	\$4.8 M	\$0.4 M		Weir removed
Copeton	\$75 M	\$5.05 M	\$4.6 M	\$17.3 M	\$19.8 M	\$16.85 M	
Tyreel Weir				\$1.3 M	\$2.6 M	X	Vertical slot
Tyreel Regulator			X	\$2.7 M	\$2.9 M		Vertical slot
Booloroo Weir				\$6.3 M	\$5.5 M	X	Lock fishway
Tareelaro Weir				\$7.0 M	\$8.8 M	X	Lock fishway
Burrendong	\$60 M	\$6.0 M	\$5.4 M	\$14.4 M	\$14.4 M	\$7.3 M	
Gin Gin Weir				\$5.3 M	\$5.0 M	X	Vertical slot
Marebone Break			X	\$4.3 M	\$4.4 M		Vertical slot
Gunningbar Weir				\$4.8 M	\$5.0 M	X	Vertical slot
Wyangala	\$65 M	\$6.05 M	\$5.7 M	\$19.0 M	\$24.9 M	\$19.7 M	
Jemalong Weir				\$6.9 M	\$10.0 M	X	Lock fishway
Condobolin Weir				\$3.4 M	\$3.5 M	X	Vertical slot

Lake Brewster				\$8.7 M	\$11.4 M	X	Lock fishway
TOTAL	\$285 M	\$35.1 M	\$31.3 M	\$69.7	\$77.3 M	\$47.85 M	

X – Onground works proposed during respective determination period

Asset Renewal & Replacement Projects

State Water lists a number of asset renewal and replacement projects in Table 7.7 (pg. 83) and discretionary capital projects in Table 7.10 (pg. 85) of their 2014 ACCC submission. If the projects involve construction, alteration, or modification of a dam, weir, or regulator, s.218 of the FM Act is triggered requiring notification of the Minister for Primary Industries, and if requested by the Minister, construction of a suitable fishway or fish by-pass is required. State Water has yet to notify Fisheries NSW concerning the scope of works listed in Table 7.7 and 7.10 for the majority of sites; and therefore s.218 requirements including cost considerations have yet to be determined. The procedure for notifying Fisheries NSW is detailed in State Water's *Fish Superhighways* document that is discussed on pg. 49 of the 2014 ACCC submission.

State Water rebuilt the Wakool Regulator in May 2013. Fisheries NSW originally assessed the proposed works at Wakool Regulator in March 2011 and notified State Water that fish passage under s.218 of the FM Act needed to be considered in developing the designs for Wakool Regulator. However, Fisheries NSW deferred determination under s.218 in order to await the findings of a research program in the Wakool system that tracked native fish movements associated with varying flows. The fish tracking research confirmed that native fish repeatedly use the Wakool River to move upstream and downstream and to migrate between the Edward River. As such, the design and location of the Wakool Regulator has the potential to adversely restrict native fish connectivity in the region. Fisheries NSW confirmed in a letter to State Water on 31 May 2013 that reconstruction works at Wakool Regulator enact provisions of s.218 of the FM Act, and that State Water is required to construct a fishway at the Wakool Regulator (see Attachment 2).

Fishway Monitoring Program

The State Water Fishway Monitoring Program was initiated in 2004 under the auspices of the Fisheries NSW and State Water MoU to address specific monitoring and reporting requirements that aim to demonstrate the effectiveness of newly installed fishways in passing the full range of species and size classes as per agreed fishway design criteria. In addition, fishway monitoring results provide adaptive management feedback for current and future fishway design and operation.

Fishway monitoring is a legislative requirement under s.218 of the FM Act to demonstrate that a constructed fishway meets the agreed design requirements. The Fishway Monitoring Program also addresses requirements outlined in State Water's Environment Management Plan (EMP) 2012-2017 which details how the Corporation upholds principles of Ecologically Sustainable Development in accordance with their Operating Licence. Objective 2 "Monitor Water Quality and Manage Operational Impacts on Aquatic Habitat" identifies improved fish passage at State Water

barriers as a key outcome, with a primary action being the implementation of fishway performance monitoring.

Fisheries NSW and State Water recently updated the Fishway Monitoring Program for 2013 – 2017. Attachment 3 outlines the rationale and objectives of fishway monitoring protocols and methodologies involved in the program so as to allow forward planning of activities and resources for State Water. Schedule 2 of Attachment 3 details estimated fishway monitoring costs over the respective period related to fish sampling and monitoring system maintenance, with monitoring expenditure between 2014 - 2017 estimated at \$536,000. Fisheries NSW notes that this estimate does not include the installation of monitoring equipment at the fishways which is completed by a third party contractor selected by State Water. Fisheries NSW requires that adequate expenditure associated with fishway monitoring be approved by the ACCC to assist in verifying fishway effectiveness and improving future designs.

Cold Water Pollution

Cold water pollution is an artificial decrease in river water temperature that occurs when cold water is released from the bottom layer within large dams. Under worst case conditions, released water can be up to 17°C colder than natural river temperatures, with the greatest variance occurring when dams are full or near full, when dams are strongly thermally stratified (i.e. during the warmer months), and when large volumes of water are being released for irrigation. Under these conditions, cold water pollution impacts can extend for up to 400 kms downstream of major dams. In total, around 2,000 kilometers of the State's rivers are regularly impacted.

Cold water pollution has both chronic and acute impacts upon fish and aquatic invertebrates. Cold water flowing from major MDB dams has eliminated and suppressed the breeding and growth of native fish, killed juvenile fish, and resulted in the loss of native fish populations in the river channels downstream of the dams. Specific impacts of cold water pollution on NSW native fish include:

- Elimination of Trout Cod, Macquarie Perch and Freshwater Blackfish from large sections of the Murrumbidgee River downstream from Blowering Dam.
- Loss of Trout Cod, Macquarie Perch and Freshwater Catfish from the Murray River downstream from Hume Dam.
- Loss of Silver Perch, Murray Cod, Rainbowfish and Bony Herring from the Macquarie River for up to 300 km downstream of Burrendong Dam.
- Suppressed breeding of native fish, particularly Silver Perch, in the Namoi River as far as 100 km downstream of Keepit Dam.
- Juvenile Silver Perch mortality of over 50 % after 30 days exposure to cold water pollution in a study conducted by NSW Fisheries.

Due to these impacts, cold water pollution is identified as a primary component of the Key Threatening Process "installation and operation of in-stream structures and other mechanisms that alter the natural flow regime of rivers and streams", listed under the FM Act.

Cold water pollution can be ameliorated by modifying dam outlet structures to enable the selective withdrawal of warm surface water. Indeed, several State Water dams already incorporate such infrastructure (e.g. Pindari, Windamere).

In response to the significant ecological impacts attributed to cold water pollution, the NSW Cabinet approved the Cold Water Pollution Mitigation Strategy in 2004 (Attachment 4). The Strategy identifies 26 dams requiring cold water pollution mitigation, with eight (8) dams deemed high priority. Of these, State Water owns or operates seven (Pindari, Copeton, Keepit, Burrendong, Wyangala, Blowering, Burrinjuck). The Strategy was divided into two stages, with Stage 1 to be implemented between 2004 – 2009 and to include the following outcomes:

- Full scale trial and verification of a low cost engineering solution (i.e. submerged curtain) at Burrendong Dam.
- Implementation of cold water mitigation works at Keepit Dam.
- Implementation of improved operating protocols (including monitoring) and structural modifications for priority dams that already have selective offtake capability - Pindari, Windamere, Split Rock and Chaffey Dam.

The outcomes of Stage 1 were to guide the implementation of Stage 2 on the remaining priority dams across the State; however, to date Stage 1 cold water pollution mitigation measures have been delayed, underfunded, or failed to be implemented. For the three outcomes listed above, construction of the Burrendong submerged curtain is expected to be completed in early 2014, funding has yet to be provided for mitigation works at Keepit Dam, and operating protocols have yet to be developed or be effectively implemented at Pindari, Windamere, Split Rock and Chaffey Dams.

The key regulatory/legislative mechanism identified to implement the Cold Water Pollution Mitigation Strategy are the Water Management Works Approvals issued to State Water under the *Water Management Act 2000* (WM Act). The WM Act and associated Works Approvals specify the dams where investigations and works must be taken over a nominated timeframe, while also specifying the ongoing operating protocols for the nominated works once they have been implemented. Attachment 5 details the cold water pollution mitigation activities within nine (9) Works Approvals for State Water owned or managed assets. The majority of outcomes specified in the Works Approvals have yet to be completed and are now overdue.

Fisheries NSW notes two further requirements for State Water to address cold water pollution. Firstly, State Water is required by 2019 to comply with the Murray Darling Basin Plan. The Basin Plan lists cold water pollution as a form of water quality degradation, and sets a water temperature target for all catchments and ecosystem types of between 20 % and 80 % of natural monthly values. The Basin Plan also requires that the quality of water released from dams is sufficient to protect and restore ecosystems and ecosystem functions to ensure resilience against future risks and threats (e.g. climate change). Secondly, State Water's Environmental Management Plan 2011 – 2016 (EMP) lists cold water pollution mitigation as a key outcome. Two actions are subsequently listed in the EMP, the first being to implement mitigating operating protocols as detailed in the WM Act Work Approvals, and the second being the investigation and implementation (subject to funding) of capital works in accordance with the Cold Water Pollution Mitigation Strategy. The lack of OPEX and CAPEX funding in State Water's 2014 ACCC submission indicates that State Water will not be able to meet its legislative obligations in regard to Cold Water Pollution.

Based upon preliminary investigations that identified a range of cold water pollution mitigation technologies, State Water submitted a request for \$25 M in CAPEX for works at Copeton (\$15.3M), Keepit (\$5.0M), Burrendong (\$4.6M), and Wyangala Dam (\$0.1M) in their 2010 IPART submission. In justifying the expenditure, State Water noted that they are obliged by legislation to meet the requirements of Works Approvals which contain conditions relating to cold water pollution mitigation, as well as to address the NSW Cabinet approved Cold Water Pollution Mitigation Strategy which identified the four State Water dams for remediation works. Furthermore, IPART noted that State Water did not constrain its cold water pollution program within an overall capital

budget for the future price path as State Water considers the scheme a State Government requirement.

In assessing State Water's proposal, IPART noted that expenditure on cold water pollution was concentrated in 2013 and 2014 due to simultaneous works at three dams. IPART determined that a more prudent approach would be to phase the expenditure to ensure that lessons learned could be applied to future capital schemes. Specifically, IPART recommended initial works to occur at Burrendong Dam to confirm the effectiveness of the submerged curtain design and operational procedure at one site before rolling out this option at other sites. IPART therefore deferred \$19.7M of funding for the Copeton, Keepit and Wyangala schemes to 2015; and approved \$5.3M of funding for Burrendong (\$3.5M) and preliminary assessments and designs (\$1.8M) at the remaining three dams.

The Burrendong submerged curtain is estimated to cost approximately \$3.0M, or a ten-fold savings over the traditional multi-level offtake option (\$30M) that was previously proposed at the dam. Fisheries NSW therefore agreed with IPART's recommendation to trial the curtain at Burrendong before proceeding with similar cold water pollution mitigation works at remaining high priority State Water dams.

Given the imminent completion of the submerged curtain at Burrendong dam in early 2014, Fisheries NSW believes it is imperative to allocate adequate funding towards monitoring and assessment of the Burrendong submerged curtain to quantify operational requirements and realised environmental benefits. A report commissioned by the Murray Darling Basin Authority in 2009 recommended a budget of \$1.2M to complete a comprehensive investigation into ecological responses to cold water mitigation at Keepit Dam (Boys *et al.* 2009).

State Water's 2014 ACCC submission makes no direct mention of OPEX or CAPEX expenditure for cold water pollution mitigation and monitoring. Regardless of construction costs for new infrastructure, significant investigative works are required to better define the problem at individual sites (as identified in the Works Approvals), develop and assess remediation options and complete detailed designs. Such works could be expected to take 3 to 5 years to complete at each site. Significant monitoring, assessment and refinement of operating protocols at those dams that already include some capacity for selective withdrawal of surface water is also required.

Fisheries NSW notes that expenditure on cold water pollution by State Water has already been deferred for many years as the NSW Government clarified the governance arrangements and undertook a review of a range of factors influencing its cost-effective management, via the Interagency Working Group (IAG). The NSW Government's cold water pollution management strategy has been developed in response to studies commissioned by Fisheries NSW and the IAG to define the issue and outcomes required. These studies have allowed the NSW Government to develop a conservative, targeted approach to addressing cold water pollution based on the review and assessment of 5-yearly incremental action plans. Fisheries NSW therefore does not support the further deferral of action to address this significant ecological issue which continues to prevent the recovery of native threatened fish species in NSW.

Fisheries NSW requests that the ACCC note the legislative requirements placed upon State Water to investigate, monitor, ameliorate and assess cold water pollution mitigation by virtue of existing Works Approvals and the impending requirement to achieve water temperature targets in the Basin Plan. Fisheries NSW will be raising with State Water the inadequacy of their proposed expenditure to cater for their legislative responsibilities in regard to cold water pollution.

Should you have any further queries, or would like to arrange a meeting to further discuss this submission, please contact Craig Copeland, Manager Conservation Action Unit on (02) 66261 353.

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Yours sincerely

A handwritten signature in black ink, appearing to read 'G. Allan', with a long, sweeping flourish extending to the right.

Dr. Geoff Allan
Executive Director, Fisheries NSW

13 September 2013

Appendix 1

Listed threatened fish species, populations and ecological communities in the Murray Darling Basin

Species/Population/Ecological Community	Listing under the TSC Act (Cwth)	Listing under the NSW FM Act	Cold water pollution identified as a contributing factor to decline in the nomination
Murray Hardyhead	Endangered	Critically endangered	Yes
Flat-headed Galaxias		Critically endangered	Yes
Trout Cod	Endangered	Endangered	Yes
Macquarie Perch	Endangered	Endangered	
Southern Pygmy Perch		Endangered	Yes
Murray Crayfish		Vulnerable	Yes
Silver Perch		Vulnerable	Yes
Murray Cod	Vulnerable		Yes
Western population of Olive Perchlet		Endangered population	Yes
Western population of Eel-tailed Catfish		Endangered population	Yes
Lower Murray River Ecological Community		Endangered ecological community	Yes
Lower Darling River Ecological Community		Endangered ecological community	Yes
Lower Lachlan River Ecological Community		Endangered ecological community	Yes

References:

Boys, C., Miles, N., and Rayner, T. (2009) Scoping options for the ecological assessment of cold water pollution mitigation downstream of Keepit Dam, Namoi River, Murray-Darling Basin Authority. NSW Department of Primary Industries.

MDBA (2012a) *Sustainable Rivers Audit Report 2 Snapshot, A report on the ecological health of rivers in the Murray Darling Basin 2008-2010*. Murray Darling Basin Authority, Canberra.

Murray Darling Basin Commission (2004) Native Fish Strategy for the Murray Darling Basin 2003-2013, MDBC Publication no. 25/04.

Welsh, L. (2010). State Water response to the draft IPART determination. 26 pp.