GREATER SHEPPARTON

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National Water Reform

Productivity Commission Issues Paper

Submission prepared by RMCG on behalf of

Greater Shepparton City Council

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1 Overview

City of Greater Shepparton

City of Greater Shepparton welcomes the opportunity to provide this submission to the Issues Paper published by the Productivity Commission as part of its inquiry into National Water Reform.

Greater Shepparton City Council (GSCC) is located in the heart of the Goulburn Murray Irrigation District (GMID) and the region is reliant on irrigation to ensure it remains a vibrant and economically important region for the production of agricultural produce. GSCC is also a member of the GMID Water Leadership group.

Despite a strong focus on the shortcomings of the NWI and its application in this submission, the Greater Shepparton City Council (GSCC) acknowledge there have been significant benefits throughout the irrigation industry, including for stakeholder irrigators in our organisations, that are directly attributable to the NWI.

NWI objectives and GSCC submission

This submission does not address all of the aims of the NWI, and is primarily providing feedback on the following NWI objectives:

a) Clear and nationally compatible characteristics for secure water access entitlements

b) Transparent, statutory-based water planning

c) Progressive removal of barriers to trade in water and meeting other requirements to facilitate the broadening and deepening of the water market, with an open trading market to be in place

d) water accounting which is able to meet the information needs of different water systems in respect to planning, monitoring, trading, environmental management and on-farm management;

e) policy settings which facilitate water use efficiency and innovation in urban and rural areas;

f) Addressing future adjustment issues that may impact on water users and communities

We have also addressed the NWI Issues paper information requests to assist, but have provided the information in three parts, definition of the problem, diversity and resilience, and some suggested solutions.

NWI issues addressed

We suggest that the implementation of the NWI has caused a number of significant, unforeseen and unintended adverse impacts inconsistent with the NWI's intent, including:

- Enabling downstream agricultural development that has not taken into account the environmental, social and economic impacts of delivering the extra water required for greenfield sites, including the impacts on upstream communities and adversely impacting on the Goulburn river.

- Perverse socioeconomic outcomes resulting from a priority weighting of NWI economic performance indicators being narrowly focused (for individual investors in water) and being inconsistent with the NWI's stated triple bottom-line objective. The lack of understanding of the interdependence of the horticulture and the dairy industry, where in extreme dry seasons (as per 2019/20) the dairy industry trades its water demand enabling the horticulture plantings to survive.

- Prioritising water trade over the protection of the environment and undermining some third-party property rights; such as the distortion of the annual yield and reliability of specific lower security entitlement products.

- The maintenance of rules based measures (eg dilution flows to SA) that have been superseded by other policies.

- An absence of performance indicators, or meaningful Monitoring, Evaluation and Reporting (MER) process as a basis for sensible assessment and adjustment of policies that is consistent with the NWI's structural adjustment provisions.

Actions and commitments

Since the NWI was established and signed off by participants in 2004, the social, economic and environmental landscape of the Murray Darling catchment has changed. The NWI 2004 prioritised addressing over allocation to improve environmental health and facilitating water trade. By contrast, this review of the NWI should prioritise actions and commitments by states that deliver:

- policies and sharing principles that recognise the impacts of increasing climate variability, particularly reducing average stream-flows

- genuine triple-bottom line outcomes and focus on how best to maintain the diversity of irrigated crop-types throughout the region including the inter connectedness of dairying with horticulture.

- maintenance of a critical and viable mass of users in established irrigation areas, and

- maintain a sustainable scale and range of irrigated agricultural production in the national interest, and the interests of rural and regional Australia.

- water trading principles that recognise the third party impacts particularly of downstream trade on the environment, delivery losses, and the deliverability rights of others.

Ideally, a revised NWI will:

- expand triple bottom performance indicators to include a commitment to delivering socioeconomic impacts for communities, processing and service industries, including recognising the interdependence of the rice, dairy and horticulture industries in the connected Murray system

- protect entitlement integrity from changes in river operations and policy drivers

- recognise that third-party interests go beyond protecting only those with a financial or legal interest in a water entitlement and include environmental impacts and impacts on other users

- force inclusive and robust monitoring, evaluation and reporting against the risk assignment framework

- enable a transition to a drier and more variable future climate that enables an equitable sharing of change between all classes of users (including modifying any prescribed or rules-based flows if required).

2 Problem definition

The NWI[1] had the objective that the reforms it promoted would:

'… result in a nationally compatible, market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes.'

The NWI also had the twin core objectives of:

- addressing the over allocation to better protect the environment
- removing the barriers to trading water entitlements and allocations.

Those objectives have now been largely achieved, which is a considerable achievement.

Unfortunately, the NWI initiative and reforms that have been implemented by Australian states since 2004 have also adversely and inequitably impacted on three groups

i. The dairy industry within the GMID and particularly within the City of Greater Shepparton region,
ii. The upstream river environment ie the Goulburn river downstream of Goulburn weir and the Barmah choke, and
iii. One particular class of water users. i.e. the holders of general security entitlement in southern NSW and Low Reliability Water Shares (LRWS) in Victoria. This impact has been made worse in a drying climate.

The NWI review now needs to restate the objectives to promote and maintain an optimal social, economic and environmental outcome.

Downstream trade has consequences

The bias towards downstream horticulture that has been created through reform application, combined with a low level of meaningful review and lack of genuine consultation since the early 2000's, has resulted in suboptimal outcomes that have placed the long term viability of regional economies at risk. In GMID case, this has seen the halving of the dairy industry over the last 20 years. Whilst at the same time there has been increased environmental damage to the Goulburn river and the Barmah choke and the ability to transfer water downstream for the environment has been compromised. This is because downstream irrigator trade from the Goulburn and Murray (above the choke) system has enabled the water use by irrigation to be maintained in the "below the choke" section of the Murray River. This "all trade is good trade" mantra fails to consider the wider triple bottom line impacts.

Horticulture development has reached its limit

There has been a sustained increase in the area of horticulture in the downstream Murray (below the choke) over the last 30 years with about 30% increase from under 100,000ha to over 130,000ha in the last 20 years[2]. This development has come at the expense of water trade from the GMID dairy

[1] National Water Initiative (2004) Intergovernmental agreement on a National Water Initiative.
[2] SunRISE Mapping and Research – "Irrigated crop area data for the Lower Murray-Darling 2003 to 2018." – MDBA 2019

industry. This water trade coupled with Basin water recovery has seen the dairy industry halve in production over the same period. Whilst this has provided an increase in Australia's overall GVIAP, it has come at the expense of the Goulburn Valley regional production. However, this ongoing horticulture development will eventually be limited to the water that is available in drought years. This limit was reached in the last drought season 2019/20 (which was a serious drought but not as bad as the millennium drought) where horticulture water use in the Lower Murray Water Region declined to just over 500GL compared to just under 600GL the previous season. This reduction in water use was over 5% (climate adjusted) and was caused by insufficient water raising water prices beyond what some horticulture could sustain. This reduction was despite the predicted increase of approx. 5% in water demand calculations[3]. The only reason that Horticulture was able to maintain even this reduced level of development this last season was by purchasing allocation water from the dairy industry. The dairy industry was able to maintain production by accessing dryland fodder as a substitute for irrigated pastures/crops as a one off strategy. This last season demonstrated the inter dependence of the horticulture industry and the dairy industry. However if horticulture increases further it will further erode the dairy industry and will be unsustainable in the next drought sequence. In other words the horticulture development has now reached its limit in the lower Murray/Goulburn area (there is still some scope for further horticulture development in the Murrumbidgee).

Allocations have reduced

Implementation of state water policies in line with NWI, has in a number of ways, also adversely impacted on the value and utility of the portfolio of water entitlements[4] now held by both irrigators and the State and Commonwealth environmental water holders. For example, as more water entitlement owners and users adapt to improve water security in the face of more insecure supply, there is a commensurate reduction in the average annual yield (or use). The LRWS (Low Reliability Water Shares) have supposedly a LTDLE (long term Diversion Limit Extraction) of 54% and 58% in the Murray and Goulburn systems. This is despite these entitlements having almost zero allocations over the last 15 years. The current investigations by the MDBA[5] into possible "underuse" by irrigators has demonstrated that the irrigators are not getting access to their share under the basin plan. In another example, the relative value of High Security entitlements does not seem to be consistent with the Basin Plan where the LTDLE for the three High Security products on the Murray are recorded as 88% for NSW and SA products but the Victorian product is 95%. Yet in the recent season 2019/20, the Victorian product received a 66% allocation compared to 100% for NSW and SA. This does not pass the common "pub test" and suggests that the rights of the Victorian's HRWS (High Reliability Water Shares) holders is lessor than their counterparts.

Fortunately, a restoration of the balance to deliver the best possible mix of irrigated agriculture is possible. GSCC on behalf of irrigators in GMID encourage the PC to recommend a strong focus on modifications to the 'trade at all costs' mantra embedded in current policy; and to deliver a productive, economically sound, equitable and optimised approach to water sharing as we continue to navigate and adapt to greater climate uncertainty.

Trade downstream requires more losses:

The use of water trading has facilitated the expansion of high value permanent plantings downstream of the traditional irrigation areas and provided a much-needed source of water for high value plantings in severe droughts. It has also enabled the development of high value orchards, without the development-expense of purchasing entitlements. That has generated benefits in terms of the value of production. However, the greater distance travelled from the water storage dam has also increased the volume of water required to be set aside to deliver that water. The growth in the quantum of this

[3] Aither June 2020 "Water Supply and demand in the southern Murray-Darling Basin (2020 update) report prepared for DELWP

[4] Referred to as 'water shares' in Victoria.

[5] MDBA "Trends in water use relative to the Sustainable Diversion Limit in the Southern Murray Darling Basin" draft 11 June 2020

transfer water which needs to be 'set aside' has reduced the volume available for allocation to general security users

Rules based approach are past their use by date:

The wider management of the water resource is properly subject to clear and transparent rules between states, and between classes of water user. However, several of those rules were predicated on flow data from more than 100 years up to 2004 i.e. much more generous water resource scenarios, are now disadvantageous particularly to holders of general security entitlements. Examples include the level of flow into South Australia being triggered by the combined volume of water in storage at prescribed dates[6] and the Barmah-Millewa Forest Environmental Water Account[7]. A drying climate has led to growers holding more water in reserve through carryover, than was the case when underuse was socialised between all users. That means the storages are now fuller at any time of the year, which perversely then triggers higher prescribed flows rates to South Australia, to the disadvantage of NSW and Victorian allocations, and particularly NSW general security licence holders.

Unnecessarily Low risk approach:

This approach is evident in the adoption of increasingly risk averse reserves and allocation policies in all states, and by Snowy Hydro in regard to Snowy Hydro Limited releases - which result in lower and later allocations particularly to NSW general security licences. This has also become evident in far lower allocations and lower water use in seasons with relatively high inflows, where previously there was an opportunity for NSW annual summer croppers to recoup lower returns in drier seasons

The change in the environmental water value:

In theory, environment entitlements that are now held by e-water agencies, have exactly the same entitlement and allocation characteristic as those still held by irrigators. In practice, environmental water managers 'call-on' water from the storage dam to increase river flows and, due to the specific flow needs required to meet environmental objectives and outcomes, cannot always prioritise meeting environmental needs from the run of the river flows or coincide with utilising the run of the river to enhance flows.

Therefore, the environment is getting not only the water that is within the system already (e.g. transportation flow, or extra flows caused by above minimum tributary inflows) that was in the past associated with irrigator's entitlement as allocation, but also the capacity to call on the full volume of announced or carried-over allocation available from the storage i.e. When water is called upon, the environment is sometimes benefitting from both the allocation associated with the allocation water called from water stored in the dam and any extra water that may be in the system as 'run of the river'. As a result, the difference created is the requirement for all water that is set-aside to achieve e-water aims is being sourced from the water storages, rather than from the first available water anywhere in the river system (to meet the demand for an irrigators diversion onto a farm). This is particularly noticeable in springtime each year (Sep-Nov) when the contribution of unregulated flows in key rivers that are able to meet irrigation demand are likely to be highest.

Although quite difficult to calculate, as irrigator demand and within season time of use patterns change, the inability to supply e-water demands from run of river means there is more water needed to be stored to meet e-water demands. The premium may typically be 120% or 130%[8] of the volume

[6] MDBA, 2020. Water Sharing in the River Murray: 'The calculation of state shares includes the shares (volumes) that each state holds in MDBA storage at the end of the month. The calculation includes volume stored and the remaining 'airspace' or volume left in storage for each state.'

[7] NSW, 2017. The Barmah-Millewa Forest was the first site along the Murray to be allocated an environmental water allocation, in 1997. A Sustainable Diversion Limit Adjustment was undertaken in 2017 to enable the allocation to be used more effectively.

[8] This is a preliminary estimate, based on a spread of demand for irrigation water between spring, summer and autumn supply .

needed in store to meet demand from irrigators holding the same number of entitlements. These risks and impacts adversely affect a large group of NSW irrigators (and sometimes the environmental water holders) as they reduce the relative security of their entitlements, and so the value of the 'products' that could be generated from their full utilisation. In addition, unlike irrigators, environmental water holders enjoy the benefits of higher reserves (or dead storage) through the increased incidence of dam spills in wetter sequences delivering increased uncontrolled river flows.

3 Diversity and resilience

One of the great strengths of the southern Murray Darling Basin has been the diversity of the irrigated sectors present. This diversity is expressed through a large number of small and large irrigation businesses involved in a wide variety of sustainable irrigation dependent industries on a diverse range of soil types and districts in three states. Along the Murray River, this has been dominated by irrigation in traditional irrigation areas, such as the GMID and within the Murray Irrigation Limited NSW footprint.

It is helpful to see these sectors as falling into three broad classes characterised by the relative security of the water resource traditionally required and utilised by growers:

- **Very high security entitlements:** Used by permanent plantings where water is required each year. Able to command premium prices in the water market

- **Medium to high security entitlements:** Accessed by the irrigated dairy sector and some higher value annual crops (e.g. cotton, corn, specialist seeds) where some reduction is possible in dry seasons through reducing the scale of production or through substitution with alternative products, such as bought-in fodder

- **Medium to Low security entitlements:** Used by annual crops (e.g. rice, livestock pasture, cereal crops) where the area planted, cropped and irrigated was directly proportional to the level of allocation available and the relative price in water markets.

This variety and diversity have resulted in optimal outcomes, such as:

- Maximum use is made of the available resource under all climatic scenarios; whereas the total area of high security permanent plantings (usually horticulture) can only ever expand to the area that can be confidently irrigated in dry to very dry seasons. Surplus allocation is available from lower value sectors to support permanent plantings in very dry seasons. This provides a buffer and insurance policy, despite the high one off cost in securing water during severe shortages

- The diverse range of sectors and their value adding processing creates diversity, value and resilience in regional economies and communities. For example, the milk factories in northern Victoria or the rice mills in Deniliquin and Leeton that employ thousands of local residents and is typically embedded within large irrigation scheme areas. There is evidence[9] of the almost unimpeded transfer of water entitlements from traditional irrigation areas during dry seasons since the drought in 2007, leaving a range of stranded public and private assets that were dependent on sustainable, regular irrigation water flows. The loss of confidence in some of the traditional districts that has been created by both droughts and the trade out of entitlements, has had a negative and snowballing effect on both on farm and processing industry investment

- The reliance on a limited range of production sectors also creates a greater risk of disruption or collapse of production, as a result of a number of potential factors, including:

  - In the case of a repeat of a severe drought such as 2007-09, the impact of developing significantly more Ha of permanent plantings than can be supported from all available water sources. This is particularly relevant given the high levels of water recovery since 2007 and the allocations of water now held as environmental entitlements are no longer available in a drought sequence

[9] RMCG (2019) Recognising under-use in the Southern Basin – and taking action. Methodology and Analysis.

- The changes in demand in a fickle international marketplace exposed to unpredictable political sentiment

- The impacts of an unforeseen event on supply, such as a biosecurity incursion. For example: the xylella fastidiosa disease[10] has killed millions of olive and almond trees in Italy since 2013, and is now threatening those in Spain and Greece

- The changes in the investment appetite of international pension funds and trusts who now control the large majority of the corporate funding for new, expanding horticultural production[11].

By protecting the interests of the unbridled expansion of permanent plantings, particularly irrigated almonds[12] at the expense of maintaining a wider, more diverse broadacre and livestock irrigated economy, risks undermining the viability of both the permanent plantings and the wider diverse production.

It is plausible that reducing diversity of agricultural production in the GMID will become irrevocable, and despite economics ultimately causing further massive adjustment as some new thirsty industries fail; Governments will be asked to foot the bill and whole irrigation dependent and once vibrant irrigation communities will have been lost.

[10] Courthouse news (2019) "A lethal central American plant disease devastating olive trees in southern Italy is now killing almond trees in southern Spain, where tens of thousands of olive trees dying from an infection by the xylella fastidiosa bacterium. There is no cure for the disease".

[11] NSW Farmers Association (2019) 'Who owns Australia's Farms?' This article indicated more than 2,000GL of water is owned by interests from China, the UK, Canada and the US. This is equiv. to 9.4% (by total entitlement number), of the total Murray Darling Basin resources assigned to irrigators.

[12] Almond Board of Australia (2019) The Almond Orchard area planted to almonds increased from ~21,000 hectares in 2006 to 53,014 hectares in 2019". More than 90% of Australian almonds are grown in the connected Southern Murray Darling Basin.

4 Solutions

The next generation NWI needs to re-state the objective of 'promoting and maintaining an optimal outcome' in terms of social, economic and environmental outcomes, by looking beyond the previous NWI aims and addressing wider and more complex outcomes.

Ideally, a renewed NWI will recognise how past achievements may now have over reached its aims, and should be concerned with the best possible ends, as much as with market driven means.

It is proposed that a staged exercise is required:

1. A specific recognition and commitment from Government that our scarce water resources should be used to generate and support diverse and resilient regional economies and communities with the largest viable geographic spread, i.e. a recognition that the market in water entitlements and water allocations may deliver both benefits and difficult to resolve legacies[13]

1. A review of the changed storage behaviour and yield versus reliability (curve)[14] that has now been created as a direct result of the changing policies around high security reliability and the use of carryover; to determine the shift that has occurred and attempt to establish an optimum point for overall social, environmental and economic benefit

2. A review of the impact of downstream water trade on the environment

3. The introduction of changes to promote these agreed revised objectives, which may include some sensible limits on the trade in entitlements and allocations.

This submission does not suggest that there is a single solution that would instantly resolve the current adverse effects, nor that dry seasons occurring in series since 2002 have not been a large contributing factor. Rather, that a serious considered analysis is required to review and reform all current policies in the context of lower total water availability and to redirect their impacts to the new targets.

As a start, the program should focus on the priority policies (outlined in Section 0) and undertake the following:

- **Ensure that third party impacts of downstream water trade are addressed**. The environmental impacts and the additional losses associated with downstream water trade must be recognised by applying sound technically based limits on downstream water trade

- **Prevent unsustainable development**. Stop implementing policies that encourage continued downstream horticulture development beyond what can be sustained in future droughts including an allowance for climate change

- **Limit trade downstream where delivery limits have been met or exceeded.** Rather than waiting for devastating failure as drought returns or rivers are unable to deliver, serious consideration should be given to limiting the total developed area of permanent plantings in lower reaches of the river systems. The added losses from the transfer of water further downstream

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[13] This is supported by the National Water Reform Inquiry Report (2017). Recommendation 9.2 Where Governments consider there are significant and rapid adjustment issues affecting communities as a consequence of water reform, the response should:
(b) consider all the factors affecting the community (not just water reform)
(c) target investment to developing the capacity of the community to deal with the impacts of structural adjustment
(d) be subject to monitoring and publicly reported evaluation of outcomes. Australian, State and Territory Governments should revise relevant provisions in the National Water Initiative to align with recommendations 9.2 (a) to 9.2 (d).

[14] Rosenberg, D. Yield v reliability is a well understood concept amongst water-managers and is best explained in a David Rosenberg lecture note: NRM+IWRM –Reservoir Operations Modelling and Yield-Reliability.

should be seasonally limited, or at very least accounted for within the water transferred. This volume should not be subtracted from the pool available for allocation to General Security licence holders

- **Improve river operations efficiency.** Equally, clear incentives should be established to encourage adoption of greater delivery efficiency in river operations, which now appear to be requiring even more water[15] to 'run the river' to deliver water to irrigators. This may follow the example of the Computer Aided River Management system for the Murrumbidgee River (CARM) supply measure project.

- **Review rules-based approaches that prescribe a fixed volume for any purpose.** Many of the current rules based approaches to river management decisions need to be reviewed and revised to reflect the new water resource scenarios, including setting aside of prescribed volumes[16], the development of 'debts' for irrigators to repay in better seasons, and the regular 'flooding out' of rules based flows by large environmental releases. Despite the complexity and difficulty in reviewing some long-held rules-based river flows, a revision should form part of revised NWI objectives

- **Best practice monitoring and compliance across jurisdictions:** In terms of unauthorised use or monitoring of diversions, the southern connected basin in NSW, Victoria and SA have had a long held culture and practice of high quality monitoring and metering of actual water use. Recent and well publicised failings in the largely unregulated river systems in the northern Murray Darling Basin must be corrected to underpin public confidence in the wider irrigation industry. In addition, the recent ACCC interim report[16] has highlighted a number of gaps and shortcomings in compliance, monitoring and reporting of both the water allocation and water entitlement markets. Much better price reporting and market information is needed for all participants in the connected marketplace

[15] NSW Water Allocation Statement, released 17 August 2020. 'The end of July accounts indicates that 4,610 gigalitres (GL) of total shared Murray resource is available in the extreme dry (99thpercentile) case, of which about 2,000 GL is needed to run the system (incorporating South Australia's dilution entitlement and any shared resource which cannot be regulated).

[16] ACCC (2020) Murray Darling Basin water markets inquiry: Interim report.

References

- ACCC (2020) Australian Competition and Consumer Commission. Murray Darling Basin water markets inquiry—interim report. https://www.accc.gov.au/system/files/Murray-Darling%20Basin%20inquiry%20-%20interim%20report.pdf

- Almond Board of Australia. Australian Almond Insights (Statistics). https://industry.australianalmonds.com.au/almond-board/almond-insights/

- BOM water dictionary. http://www.bom.gov.au/water/awid/index.shtml

- Courthouse news (2019). Article: https://www.courthousenews.com/plant-disease-is-devastating-spains-almond-trees/

- Interim Inspector-General of Murray Darling Basin Water Resources 2020, Impact of lower inflows on state shares under the Murray Darling Basin Agreement, Canberra. https://www.igmdb.gov.au/sites/default/files/documents/iig_final_report.pdf

- Murray Darling Basin Authority (2020) Water Sharing in the River Murray. https://www.mdba.gov.au/river-information/water-sharing

- NSW Farmers Association (2019). Article: Who owns Australia's land and water? http://www.nswfarmers.org.au/NSWFA/Posts/The_Farmer/Environment/Who_owns_Australias_land_and_water.aspx

- NSW Water Allocation Statement: NSW Murray and Lower Darling (17 August 2020)

- NSW (2016) Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2016 (updated 21 June 2019) https://www.legislation.nsw.gov.au/#/view/regulation/2016/366

- Productivity Commission National Water Initiative Inquiry (2017). https://www.pc.gov.au/__data/assets/pdf_file/0007/228175/water-reform.pdf

- National Water Initiative (2004) Intergovernmental agreement on a national water initiative: Between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory. 2004. https://www.pc.gov.au/inquiries/completed/water-reform/national-water-initiative-agreement-2004.pdf

- NSW DPI (2018). Water reform technical report: Derivation of LTDLE factors in NSW. https://www.industry.nsw.gov.au/__data/assets/pdf_file/0019/162181/techncial-paper-derivation-technical-factors-nsw.pdf

- RMCG (2019) Recognising under-use in the Southern Basin – and taking action. Methodology and Analysis. https://investors.sunrice.com.au/FormBuilder/_Resource/_module/2weQNICYSUy13FE_jxQXvg/file/external-reports/RMCG%20Report.pdf

- SunRice (2019) SunRice submission to ACCC enquiry into water markets in the Murray Darling Basin Issues Paper (2019). https://www.accc.gov.au/system/files/Redacted_Water%20Inquiry%20-%20Submission%20-%20SunRice.pdf

- Rosenberg, David. Reservoir Operations Modelling and Yield-Reliability. http://rosenberg.usu.edu/classes/cee5460/Lecture-ReservoirOperations-StudentVersion.pdf.