SUBMISSION TO

MURRAY DARLING BASIN ROYAL COMMISSION (S.A.)
for Shepparton Hearing 3.5.2018

This is an irrigation farmer's submission to the South Australian Royal Commission into aspects of the Murray Darling Basin. It has been written outside the normal twelve hour work day and with limited access to reference material. However an earlier professional career, and, subsequently, extensive involvement in industry bodies over three decades has provided a perspective for my view (see personal background in Appendix 1).

Issues raised in this submission are organised under parts of the terms of reference and inquiry direction from the Governor.

ISSUE 1 : C-a; "water resources that are over allocated or overused"
Clearly this supposition is fundamental to the MDB Plan and your enquiry. Generally speaking, analysis of this supposition has been handled poorly, thus leading to the usual public perception that all irrigators can be so accused. It is essential that this is examined properly in the context of catchments and regions and reported on accordingly.

Victoria's allocation policy, dating back over many decades, has focused on a specific statuary volume of water for irrigation diversions in each river catchment. This volume becomes available after numerous other water commitments are satisfied. By comparison with many other MDB regions the Victorian approach is very conservative and thereby achieves a higher reliability. The amount of this volume available for consumptive purposes is reviewed annually.

The confusion arises when discussions move from the above statutory allocation to allocations for an irrigated season. In Victoria seasonal allocation follows a three step process. Firstly an allocation is made based on the proportion of the volume specific to irrigation use in the system. Normally this is expressed as a percentage of HRWS. In an average or better year this would be expected to rise to 100% HRWS.

In the second stage, State authorities put water aside (in storage) for the next irrigation season. This stage is achieved when 100% of HRWS is stored.

The third stage in a given season depends on inflows of water surplus to the above. This can only be allocated after all the other demands are satisfied. Such water originally came to irrigators as 'sales' e.g. in a 200% season, 100% of water right was available plus a similar volume as sales.

As irrigation farms developed their potential between about 1960 and 2000 these businesses did plan to maximise use of available water. But this had to be done within the above defined boundaries.

Table 1, seasonal water allocation, provides an historical view up to 2007. Several discussion points can be made from this data.

TABLE 1 : Seasonal Irrigation Water Allocations

Segmented by irrigation system expressed as a percentage

Year ending 30th June	Murray	Goulburn	Campasspe	MIL(NSW)
1962	165	165	165	
1963	165	165	165	
1964	180	180	180	
1965	160	160	180	
1966	150	150	150	
1967	165	165	165	
1968	110	110	110	
1969	165	165	165	
1970	200	200	200	
1971	200	200	200	
1972	200	200	200	
1973	160	160	160	
1974	200	200	200	
1975	200	200	200	
1976	200	200	200	
1977	170	170	170	
1978	200	200	200	
1979	200	200	200	
1980	220	200	200	
1981	180	180	200	
1982	200	200	230	
1983	130	130	130	
1984	200	200	200	
1985	200	130	220	
1986	200	140	200	
1987	200	200	200	
1988	200	200	200	
1989	200	200	200	
1990	200	200	200	
1991	200	200	200	
1992	200	200	200	
1993	200	200	200	
1994	200	200	200	
1995	220	200	180	
1996	200	150	200	87
1997	200	200	220	93
1998	130	120	140	68
1999	200	100	100	77
2000	190	100	100	29
2001	200	100	220	78
2002	200	100	180	86
2003	129	57	100	8
2004	100	100	100	45
2005	100	100	33	45
2006	144	100	31	56
2007	95	23	0	0
Total Average	**178.87**	**161.30**	**169.43**	**56**
Last 20 Yr. Av.	**185.40**	**152.50**	**160.20**	
Last 10 Yr. Av.	**148.80**	**90.00**	**100.40**	**49.2**
Last 5 Yr. Av.	**113.60**	**76.00**	**52.80**	**30.8**

A few factors assisted the frequency of 200% years in Victoria's Murray system and included ability to trade water, storage capacities, seasonal conditions and 'sleeping irrigators' releasing water into the consumptive pool. Importantly , the mindset of managers of irrigated enterprises was that the these would be the typical volumes available and what they observed was buoyed by being told Victoria had a most conservative approach to water allocation, both in defining statutory volumes and in the process of annual allocation. Consequently more permanent production systems requiring considerable on-farm investment were developed.

Coincidentally with unbundling in 2007 other forces were causing irrigators to reappraise their management and the future of major on-farm infrastructure. These forces included Living Murray initiative, millennial drought and MDB Plan.

In the eleven years since 2007 irrigators have been conditioned into thinking they are fortunate to be allocated 100% of HRWS. They have dealt with their dilemna in many ways and for a large number this has involved outright sale of HRWS. For such people not exiting the industry this was seen by those remaining as an avenue to access funds. For a large number of those striving to remain in business these funds were absorbed in meeting day to day expenses. Without HRWS these irrigators were dependent on temporary trade and too frequently found themselves with short term cash deficiencies that in many cases brought about the need to reappraise their future.

A generation of people in Shepparton Irrigation Region(SIR) cannot understand talk of over allocation and the now emerging distinct possibility of the SIR having a future based on pockets of irrigated horticulture and large expanses for formerly irrigated land used for dryland enterprises which will be required to pay fixed charges for Delivery Share associated with their farm.

Consequently policy makers and commentators should exercise extreme caution before the words "over-allocation" and "over-use" so that the actual situation unique to each catchment is described. Otherwise a serious disconnect will persist.

Clearly the allocation concept specifically relates to particular catchments or irrigation districts. Each has its own way of determining allocation just as they have their own unique approaches to defining consumptive pool for irrigation.

Table 1 illustrates just one of these differences with the allocations for NSW's Murray Irrigation area. They appear meagre when compared to Victorian allocations in the same year. Appreciation of the reality of the situation requires a mindset that can comprehend the basis for allocating water each season to their irrigation pool. Attempts have been made to provide some notion of equivalence between General Security, High Security and Low Security with Victorian terminology but confusion still persists. Other concepts like 'off-season flow' and varying approaches to on-farm storage make comparison difficult. For instance, the owner of a Victorian irrigation storage dam must own HRWS equivalent to its volume. Additionally the rules determining the harvesting of overland flows vary across the MDB.

Historically the MIL allocation system was set up for more opportunistic irrigation in seasons with plenty of water. An approach of using what is there in a season contrasts with Victoria's conservative approach that was shaped by demands of horticulture and pasture systems.

ISSUE C-f, and C-d

The issue of "optimising social economic and environmental outcomes" together with the issue of "equitable efficient and sustainable use of water and other natural resources in the MDB" pose one of the most vexed set of guidelines of our time.

Obviously the Royal Commission has the task of attempting to integrate the many aspects and perceptions on these concepts.

My contribution is not to repeat or comment on the topics usually debated. Instead, I bring to you for consideration some ideas rarely, if ever, mentioned –

"Making every drop count" ; this was the title of a recent House of Representatives Standing Committee on Agriculture and Water Resources (Dec.2017). This title could be used to consider both how and where water is used. The report concentrated on the 'how' aspects. The following comments concern matters relating to 'where' water is used. This is examined because irrigation water can achieve different plant responses in different regions. The actual count associated with each drop will depend on where it is used.

(i) Rainfall and evapotranspiration

Current policies encourage movement of irrigation water to districts with less rainfall and greater evapotranspiration. This occurs over a wide spectrum of situations across the MDB. For instance a 500mm average rainfall district can be contrasted with a 250mm district where the respective annual evapotranspiration rates are 150mm different. This example indicates a 250+150=400mm difference. This 400mm is the equivalent to at least 4 Ml/ha on a farm with perennial planting or a double cropping system.

Data describing irrigation requirements at different locations is published weekly by agencies such as Agriculture Victoria (Echuca office) for numerous locations. For instance the Irrigation requirement (mm) in the period 15.8.17 to 27.4.18 was 1448mm and 958mm at Deniliquin(NSW) and Numurkah(Vic). This represents a difference of 4.9 Ml/ha to maintain a similar moisture profile in the stated period. Consequently every 10,000 ha irrigated in the semi- arid zone could require at least another 40 Gl to achieve plant growth conditions similar to the temperate zone.

As an example of productivity difference, Table 2 gives an indication of variation in annual production for a double cropping system. The more temperate area achieves 66% more production per megalitre of irrigation water. The result is a function of water applied to overcome rainfall deficiency and evapotranspiration losses and would also be associated with plant stress factors.

Table 2 : Double cropping example of water productivity

Location	Numurkah	Semi-arid zone
Silage yield (t.DM/ha) from cereal and maize crops	35	25
Water use (Ml/ha)	7	14
t.DM/Ml	5	1.7

Clearly fodder production systems in districts with higher rainfall and more temperate climate produce fodder of high quality (greater 11 MJ of ME per kg of DM).

As a nation we seem trapped by the notion that water can be the elixir of the desert. Indeed it is, but it can be much more productive when used in more temperate zones. Obviously land prices, desire to escape established irrigation scheme fees, climate influences on seasonality are also part of decisions causing the enormous shift of water use to Mallee areas of Vic.,NSW, and SA. However his shift has a major influence on plant production, especially if it is measured in terms of megajoules of metabolisable energy available for human nutrition. If, as a nation, we were not so concerned with choice of type of food, well over twice as many people could be fed from plant production systems operating in more temperate areas.

(ii) Conveyance losses

Present arrangements ignore these losses. A megalitre at Albury, if traded, is a megalitre at Renmark. Data specifying these losses in river systems are subject to wide variation because of a number of factors. Losses in channels are known with an 80% conveyance over 200Km being reasonable. Water accounting methods do not show the efficiency with which water is conveyed in different MDB rivers and creeks at various times of the year. River management practices would vary conveyance losses. For example, the increasing dependence on off stream storage e.g.Lake Boga, to assist satisfy peak demands that may be constrained by permissible upstream river flows, need consideration.

(iii) Energy considerations

The Shepparton Irrigation Region (SIR) was established as a gravity flow irrigation system with the original schemes integrating hydro-electricity and irrigation. The operation of the SIR as a total system has been shown to give our community a net gain of some 600 MJ/Ml water delivered to a farm (*CROKE 1979).*

The method of delivering water to agricultural production systems has changed markedly in recent years. The 2000 Gl or thereabouts delivered annually in the GMID almost entirely arrived at farms by gravity flow up to the turn of the century. Since then about 1000 Gl of this water is not used on the district's farms.

Downstream reaches of the river, beyond gravity flow channels cannot benefit from diversion weirs. Many different types of pumping and pressurisation systems are used. For every 1000 Gl of water lifted from the river and usually re-energised on farm, at least 1000 MJ/Ml is required, or a total of 1,000,000,000 MJ of energy. If supplied by diesel motors this is equivalent to about 26 million litres of fuel.

From a national perspective our irrigation industry has adopted a risky position in view of dependence on overseas liquid fuel with minimal national storage and the alternative of a challenged electricity grid.

(iv) Plant physiology

Rarely, if ever, are MDB considerations guided by the best place to grow plants to achieve water economy. Plant stomata largely determine water regulation but only operate effectively within particular temperature bands. Beyond 30oC stomatal regulation becomes less effective with most species going into a wilt due to loss of turgor in stomatal guard cells. As temperature increases most species used in agriculture suffer serious decline in their enzyme systems which determine photosynthesis, respiration and production of plant constituents. Abundant data in the scientific literature describes these processes and their impact on yield.

Current trends in irrigation development require plants to produce in more unsuitable climates, with the degree of productivity depression dependent on species, and increasingly, the incidence of severe heat wave episodes.

(v) Underutilisation of the SIR

The water distribution system is nearing the end of a two billion dollar upgrade. Compared to delivery expectations (2000 Gl/yr) when this project started, a decade later only half this volume is being delivered. Furthermore, 80% of this water is delivered in 20% of the channel system. This leaves 80% of the upgraded system to deliver 20% of the water. (GMW 2018). A diminishing number of irrigators remain to pay operation and maintenance costs.

These irrigators find themselves unable to comprehend how most farming systems will be able to afford water in scenarios of future water loss from the region. MDB policies are not the only threat to available future water in the district. With the average age of northern Victorian irrigators at 58 years (Adelaide Univ.2016) there is a distinct possibility most of these retiring irrigators will sell water to market demand from downstream irrigators, further exacerbating economies of scale for water delivery.

(vi) Climate change

Any proper consideration of irrigation in the MDB should include trends now apparent, and predictions on climate change effects, for at least the next 50 years. A multitude of factors could shape the best way our nation uses its water resources to ensure the most sustainable future for food productivity. Of equal importance will be decisions how to adapt environmental goals for the changing conditions, rather than attempt to recreate recent ecosystems.

A sea level rise of 0.5 metre must be given due consideration, particularly for structures around Goolwa and for the Lower Lakes. The MDB needs to develop a coherent policy on future arrangements so consequences and costs of denying a natural river estuary can be accepted by our nation.

(vii) Tipping point for SIR irrigation area

The dependence of a high level of utilization of an irrigation scheme's channels and infrastructure has been emphasised. In future seasons with low allocation of water across the MDB, demand from irrigators with permanent plantings will make returns from temporary trade irresistible to many in the SIR, as will subsequent decisions to sell HRWS (RMCG 2016). Such an event is possibly the greatest threat to SIR.

(viii) Inability to realize return on recent public investment in irrigation infrastructure

The Connection expenditure ($2 billion) and on-farm efficiency work (several hundred million $) are threatened with redundancy. Many farms have individually received more than one million dollars in recent years. Their withdrawal from irrigation has serious consequences for future potential productivity in the MDB.

References :

Croke B.D. (1979) "The effect of increased fuel prices on the costs of production of irrigated agricultural and horticultural products in Australia." In 'Energy and Agriculture' published by CSIRO.

House of Representatives Standing Committee on Agriculture and Water Resources(Dec.2017) "Making every drop count"

Goulburn Murray Water Strategic Advisory Panel (Feb.2018) "Independent Report to Minister for Water"

RMCG (2016) " Understanding Water Availability Farm/Food Processor Viability in GMID"

APPENDIX 1

Personal Background

Name : Barry CROKE

Address : Vic.

Academic Qualifications

1964	Graduated B.Agr.Sci., University of Melbourne
1965	Graduated Dip.Ed., University of Melbourne
1980	Graducated M.Agr.Sci., University of Melbourne, for the thesis "The Dependence of Irrigated Dairy Farming and Associated Industries Upon Support Energy"
1983	Undertook the Executive Management Course, Australian Administrative Staff College, Mt.Eliza.
1993	Company Directors course by correspondence with UNE.

Employment History

1956-62	Vacations almost entirely taken up with employment on many types of farms.
1962-66	Earthmoving plant operator during vacations.
1966-68	Science teacher, Mildura High School
1969-74	Lecturer in Animal Production, Dookie Agricultural College
1974-79	Senior Lecturer, Animal Production, Dookie Agricultural College
1976	School of Agriculture and Forestry, University of Melbourne, commenced Masterate work, part-time lecturing to agriculture and veterinary science undergraduates, completed six of the seven Graduate Diploma of Extension subjects.
1979-82	Principal Lecturer, Dookie Agricultural College
1982-July 1989	Principal, Dookie Agricultural College
1989-present	Farmer, full-time, dairying and irrigated cropping and farm contracting.

Positions held in professional and community organisations

1990-96	Director, Australian Dairy Research & Development Corporation
1994-96	Director, Australian Food Ingredients Application Centre
1996-98	Director, Sustainable Regional Development Board, Shepparton
1998-2004	Director, Murray Dairy
2004-present	Executive Member and Chair, Northern Victorian Irrigators Inc.
2004-07	President, Victorian Irrigation Council
2006-08	Chairman, Irrigators Australia Ltd.(peak body of MDB State Irrigation Councils)
2006-10	Chair, Murray Valley Irrigtion Reconfiguration Committee
2007	Member, Foodbowl Steering Committee

2007-11	Member, Murray Valley Irrigation District Modernisation Committee
2008-12	Director, National Irrigation Council
2008-14	Member and Chair of Murray Valley Water Services Committee
2008	Member, Consultative Committee, DSE for Northern Region Sustainable Water Strategy
2008	Member of Planning Committee linkin Vic.Dept.of Primary Industry and Northern Victorian Irrigation Renewal Project for the modernisation of irrigation infrastructure on and off farm.
2008-present	Chair, Naringaningalook Irrigators Inc.
2011-present	Member, Farm Water Project Advisory Committee (part of GBCMA)
2011-present	Member, Sustainable Irrigation Program Advisory Group (part of GBCMA)
2013-present	President, Naringaningalook CFA
2015-present	Chair, Naringaningalook Landcare
2015-2018	Director, Irrigated Cropping council