Senate Select Committee on the Murray-Darling Basin Plan
Answers to questions on notice

Hearing: Friday 18 September 2015
Witness: Commonwealth Environmental Water Holder
Hansard Page: Page 14
Question Type: Spoken

Senator McAllister asked:

Senator McALLISTER: You mentioned four objectives which sit within the environmental watering strategy, which went to vegetation, fish, colonial birds and connectivity. Whether from an existing document or one that you create, could you provide on notice for this committee a brief explanation of the ecological issues that relate to environmental water and the way it has the potential to impact on outcomes in each of those four domains?

Mr Papps: Yes. I should have mentioned right at the beginning—apologies, Senator—that I submitted a very brief submission this morning that provides the very basics of what we do. We have the information you seek. There is a very clear relationship between the decisions we make and those outcomes, so we can provide that documentation.

Answer:

Environmental decline in the Murray-Darling Basin

Many of the native animals, plants and ecological communities of the Murray-Darling Basin are adapted to the high flow variability of the Basin's rivers. The health and survival of these native species is closely tied to having both wetting and drying periods, and flows at the right time of year.

The development of the Basin's water resources has changed the size, variability and timing of flows in the Basin's rivers. While the very large floods still occur, smaller-sized floods and high in-channel flows are often constrained or captured by dams, direct extraction or on-farm storages. These smaller events are important for ensuring the environment is resilient and able to survive in drought years. Rivers in the southern Basin naturally peaked in winter and spring; now flows are managed to peak in summer in order to meet the needs of irrigators. Changes to seasonal peaks affect breeding, feeding and germination opportunities for native animals and plants. Damming rivers and changing the season of peak flows can also lead to cold water pollution, in which cold water is released into rivers from large dams during warmer months. This can affect temperatures in river systems many hundreds of kilometres downstream from the storage and can limit the breeding, growth and survival of native fish.

Changes to river flows have contributed to the documented long-term declines in the health and size of native fish and waterbird populations, wetlands, floodplain forests, woodlands, and grasslands. While there have been positive environmental outcomes in response to the floods that followed the millennium drought, the long-term trend in the health of the Basin has been one of decline. Recent research has indicated that many species have not returned to levels observed prior to the millennium drought.

Healthy rivers underpin the social, cultural and economic values of the Basin's water resource. Without water stored, filtered and delivered through rivers and wetlands, rural towns could

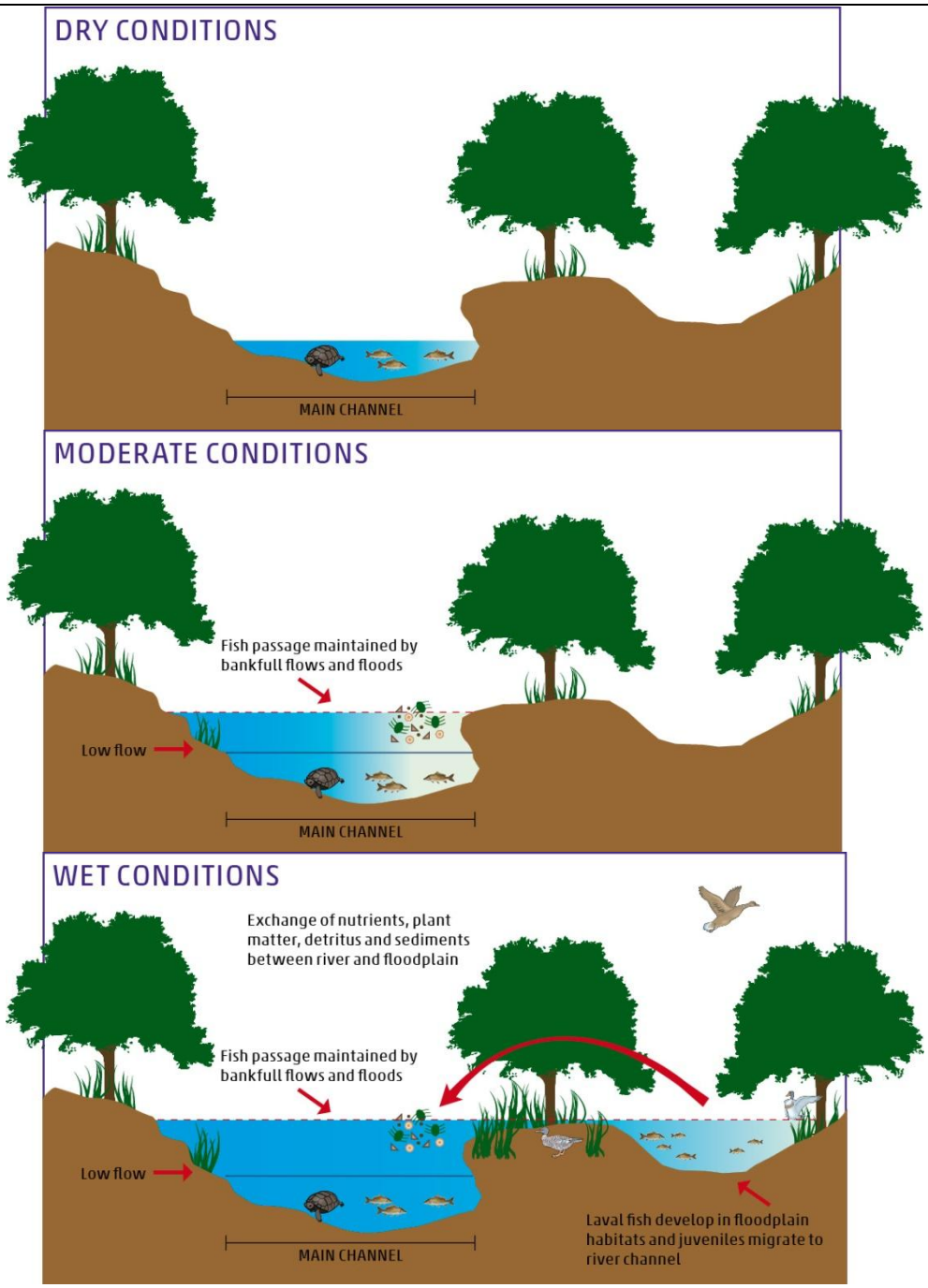
not have drinking water, irrigators could not grow their crops, pastoralists could not water their animals and the wellbeing of communities would suffer.

Changing river flows has affected how rivers, wetlands and floodplains function, leading to or exacerbating a variety of environmental problems. Over the past 30–40 years, communities across the Basin have had to manage issues such as salinity, blue-green algae, acid sulphate soils and riverbank and gully erosion. These issues have real cost impacts on communities, as they affect the ability of these water resources to support domestic and agriculture water use, tourism and recreational activities, and cultural values. While progress has been made in mitigating some of these impacts (e.g. through joint-government efforts to manage salinity), there remains an underlying need to restore key flows to maintain the overall health of the Basin's water resources and underpin long-term sustainable use.

The role of environmental water

Environmental water is not trying to restore the Basin back to its pre irrigation development state—it is used to restore key flows that have been removed or reduced due to water use and regulation. These flows are needed for animals and plants to survive through the variable climate of the Basin. The type of flows and the outcomes they support will vary depending on whether under wet or dry conditions. This is illustrated in Figure 1 below. The timing of flows is also important to support environmental outcomes. Most consumptive water is delivered at a steady rate over the summer to match consumptive demand. In contrast, environmental water is delivered throughout the year, including in winter and spring, to match ecological needs. While environmental water is important, it alone will not guarantee the health of the Basin. It is widely recognised that there needs to be continued effort in natural resource management activities (such as pest and weed management, and revegetating river banks and floodplains), to complement the use of environmental water.

Figure 1: Environmental watering under different conditions



Dry conditions – During droughts there may be no connection between wetlands across a landscape. Environmental water directed from the main channel may provide low flows, flushing waterholes, improving water quality, and providing refuges for plants and animals.

Moderate conditions – In moderate conditions when there is low flow in the main channel, environmental water may be used to provide in channel river flows. This increases connectivity along the river channel and may improve the amount of habitat available by engaging secondary channels.

Wet conditions – During wetter times environmental water may be used to improve the connectivity between floodplain wetlands and the main channel. This is important for exchange of nutrients, sediments and genetic material to support biodiversity. Environmental water may be used to maintain water levels in wetlands and floodplains by piggy-backing on peak flows or slowing the recession following the peak. The opportunities for overbank flows may be limit by delivery constraints.

What are we trying to achieve?

The **Basin Plan**'s environmental watering plan establishes the objectives, processes and principles that guide the management of environmental water by the MDBA, Basin States and the Commonwealth Environmental Water Holder. The environmental watering plan and its supplementary documents provide key inputs into the planning and use of Commonwealth environmental water. In particular, they identify the long-term and annual environmental demands across the Basin.

Basin-wide long-term environmental objectives and outcomes

The **environmental watering plan**'s overall objectives can be summarised as:

- protect and restore the Basin's water-dependent ecosystems (that is, the rivers, wetlands and floodplains of the Basin, and the native plants and animals they support)
- protect and restore the functions that underpin these ecosystems; and
- ensure these ecosystems are able to withstand threatening impacts.

The environmental watering plan also sets broad targets to measure progress towards meeting the objectives. Up to 2019, the focus is on 'no environmental loss or degradation'. From 2019 onwards, it is expected there will be broad environmental improvements.

The **Basin-wide environmental watering strategy** provides the next level of detail on the environmental objectives and targets. It describes the environmental outcomes expected over the next decade as a result of implementing the Basin Plan and associated water reforms. These outcomes focus on four components: river flows and connectivity; native vegetation; waterbirds; and native fish. Examples of the expected outcomes include:

- a 20–25% increase in waterbirds
- a 10–15% increase in mature Murray cod and golden perch at key sites
- maintenance of the current area and condition (and in some regions, improved condition) of river red gum, black box, coolabah and lignum communities
- improved overall flow, such as 10% more flow in the Barwon-Darling, 30% more flow in River Murray and 30–40% more flow to the Murray mouth.

Catchment long-term environmental objectives and outcomes

At a catchment scale, **long-term watering plans** are being prepared by Basin state governments. The plans will identify the key rivers and wetlands in each catchment, and the objectives, targets and environmental watering requirements for each river or wetland.

These plans are being developed over the coming years (with the first plans expected to be completed in 2015). In the meantime, environmental water managers will continue to draw on information from a large number of existing documents that describe environmental watering requirements for specific wetlands and catchments, as well as local knowledge and monitoring results.

Annual priorities

Prior to the start of each water year, annual environmental watering priorities are prepared by Basin state governments (for each catchment) and by the Murray-Darling Basin Authority (for the Basin as a whole). The annual priorities inform the development of portfolio management plans for Commonwealth environmental water.

Outcomes from Commonwealth environmental water

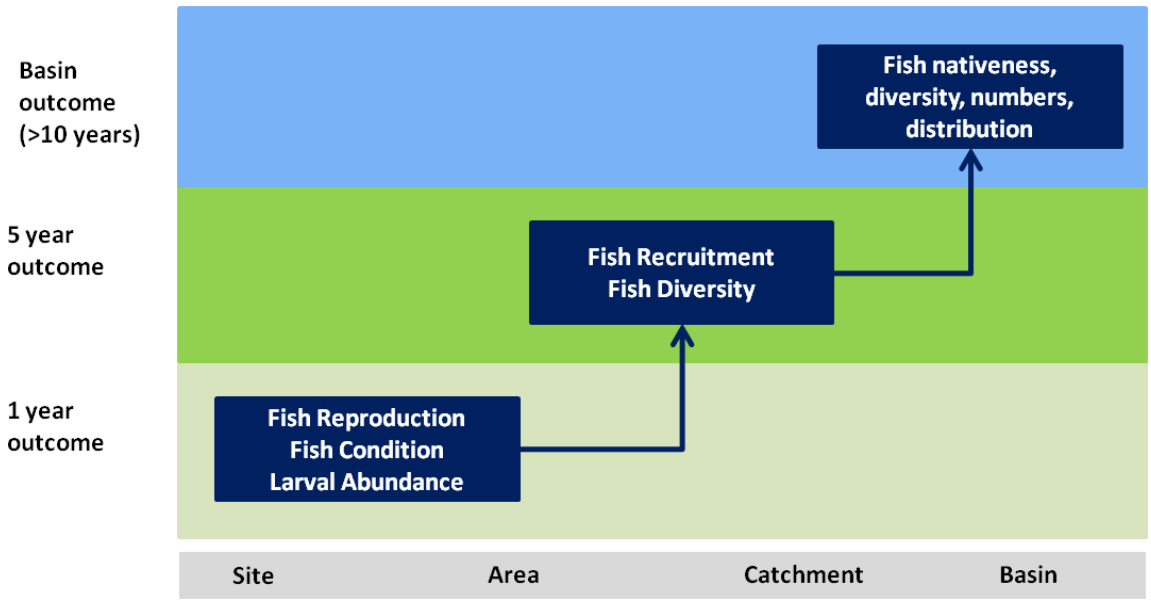
The above environmental objectives, outcomes and targets are all long-term. However, individual environmental watering actions are undertaken over much shorter timeframes. Therefore, it is necessary to identify the short-term outcomes that will contribute to these longer-term objectives.

The **Commonwealth Environmental Water Outcomes Framework** identifies outcomes that can be expected from Commonwealth environmental watering:

- in less than one year (1 year outcomes)
- between one and five years (5 year outcomes).

When these shorter-term outcomes are achieved over multiple years, the best available science indicates that they will cumulatively contribute to meeting the longer term objectives and outcomes.

CASE STUDY: Environmental water outcomes for fish



Expected outcomes for fish in less than one year

Murray cod and golden perch are found at a site with suitable habitat. Australian smelt and gudgeons are found at another site within the catchment. These fish need to be in a healthy condition to reproduce. Condition of fish contributes to the abundance of larvae and the capacity to reproduce. These outcomes can generally be achieved in less than one year.

Expected outcomes for fish in one to five years

Having healthy fish reproduce is only part of the picture. These larvae and juveniles need to be abundant enough to reach a sufficient life stage to successfully recruit into the population. In general this takes longer than one year and is at a broader spatial scale. Larval and juvenile recruitment is an important contributor to fish diversity. Fish diversity can also be achieved by maintaining the condition of fish at individual sites. Supporting different native fish species through condition and larval and juvenile recruitment at multiple areas contributes to native fish diversity at the catchment scale.

Whole of Basin outcome for fish

Commonwealth environmental water is provided to multiple catchments. Where watering achieves outcomes for fish, the outcomes framework can be used to infer a contribution to Basin scale outcomes over a much longer timeframe e.g. a healthy adult native fish population that has increased across the Basin.

The Basin has many diverse aquatic environments. The outcomes associated with fish species endemic to particular catchments (e.g. the limited range of purple spotted gudgeons) could also be used to infer Basin scale outcomes as we know that any improvement in these species within their limited range represents an improvement in this particular species across the Basin.

The Commonwealth Environmental Water Outcomes Framework is summarised in the below table.

Table 1: The 1 and 5 year expected outcomes from Commonwealth environmental water and how they will contribute to Basin outcomes [*note that the expected outcomes of the Basin-wide environmental watering strategy will be achieved through the efforts of all governments in implementing the Basin Plan, and not solely through Commonwealth environmental water. The monitoring of the Basin-wide environmental watering strategy outcomes is the responsibility of the Murray-Darling Basin Authority*].

Basin Plan Objectives	Basin Outcomes		Basin-wide Environmental Watering Strategy – Expected Outcomes	5 year Expected Outcomes	1 year Expected Outcomes
Biodiversity (Basin Plan S. 8.05)	Ecosystem diversity			• Species diversity	
	Species diversity	Vegetation	• Maintenance of the current extent of river red gum, black box, coolibah forest and woodlands; existing large communities of lignum; and non-woody communities near or in wetlands, streams and on low-lying floodplains • Maintain the current condition of lowland floodplain forests and woodlands of river red gum, black box and coolibah • Improved condition of southern river red gum	• Vegetation diversity • Growth and survival	• Reproduction • Condition • Germination • Dispersal
		Macroinvertebrates		• Macroinvertebrate diversity	
		Fish	• Improved distribution of key short and long-lived fish species across the Basin • Improved breeding success for short-lived species, long-lived species and mulloway • Improved populations of short-lived species, long-lived species, Murray cod and golden perch	• Fish diversity • Larval and juvenile recruitment	• Condition • Larval abundance • Reproduction
		Waterbirds	• Maintained current species diversity of all current Basin waterbirds and current migratory shorebirds at the Coorong • Increased abundance with a 20–25 per cent increase in waterbirds by 2024 • Improved breeding events for colonial nesting waterbird species and an increase in nests and broods for other waterbirds	• Waterbird diversity • Waterbird population condition (Abundance and Population structure)	• Survival and condition • Chicks • Fledglings
		Other vertebrate diversity		• Adult abundance	• Young

Ecosystem Function (Basin Plan S. 8.06)	Connectivity		• Maintained base flows - at least 60 per cent of natural levels • Improved overall flow • Maintained connectivity in areas where it is relatively unaffected • Improved connectivity with bank-full and/or low floodplain flows • Maintain the Lower Lakes above sea level		• Hydrological connectivity including end of system flows
			• Improved movement with more native fish using fish passages		• Biotic dispersal and movement
					• Sediment transport
	Process				• Primary productivity (of aquatic ecosystems) • Decomposition • Nutrient and carbon cycling
	Water quality	Chemical			• Salinity • Dissolved oxygen • pH • Dissolved organic carbon
		Biological			• Algal blooms
Resilience (Basin Plan S. 8.07)	Ecosystem resilience			• Population condition - individual refuges - landscape refuges - ecosystem recovery	• Individual survival and condition (Individual refuges) • Individual condition (Ecosystem resistance)

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Senator Leyonhjelm asked:

CHAIR: If there were an instance of flooding of private property without consent, would that be your responsibility or the responsibility of the state body that has a second look at these things?

Mr Papps: That is a highly complex legal question that I would have to take on notice. There are existing provisions in every piece of state legislation that go to this question of indemnity and that involve the interaction between all the players. I cannot give you a comprehensive legal answer except to say that those laws exist and would govern the consequences of those circumstances arising.

Answer:

The Commonwealth Environmental Water Holder has not and will not place water orders that would flood private land, without the consent of the landholder. In the unlikely event that there were any adverse impacts that may result from the use of Commonwealth environmental water, the assignment of legal liability for those impacts would depend on the circumstances of a particular case. To date, state agencies and river operators have been responsible for the physical release of Commonwealth environmental water to the intended environmental asset. These agencies have statutory obligations in relation to the delivery of water that apply regardless of whether the water is intended for consumptive or environmental use. The responsibility of the Commonwealth and the delivery partner, in each case, will depend on the relevant legislation and the terms of the agreement with the delivery partner.