



DIVERSION SCREENING

SIGNIFICANT NUMBERS OF FISH ARE LOST FROM OUR RIVERS ANNUALLY AT IRRIGATION DIVERSIONS AND PUMPS. FISHERIES SCIENTIST CRAIG BOYS DISCUSSES HOW ADDRESSING THIS ISSUE WITH PROVEN TECHNOLOGIES IS AN OPPORTUNITY TO SUPPORT NATIVE FISH AND MAKE IRRIGATION MORE PROFITABLE.

The Murray–Darling Basin (MDB) Plan is seeking to secure both the competitiveness of Australia’s agricultural sector and the long-term health of river ecosystems. To this end, huge investment is being made into modernising aging and inefficient irrigation delivery systems to achieve water savings.

Improving water efficiency alone will not, however, achieve the biggest ‘bang-for-buck’ from either an economic or environmental perspective. In many parts of world (including the United States (USA), Europe and New Zealand), diversion screens are considered a critical component of any best-practice, whole-of-farm approach to irrigation modernisation. Diversion screens are a reliable way to prevent fish losses from rivers, as well as improving the efficiency of water delivery and profitability of irrigation.

1. Screening significantly reduces fish losses from rivers

Over the last decade, research has been underway to better appreciate the extent of fish losses at irrigation diversions, and to develop appropriate solutions. The research has shown that hundreds of fish a day can be removed from rivers by a single pump, of which there are over 4500 with diameters greater than 200 millimetres, licenced within New South Wales alone. Studies in Queensland’s Condamine catchment have recorded over 12,000 native fish being removed by a single 300 millimetre diameter pump over a 9-hour period. Studies in the mid-Murray suggest that over 1 million fingerling Murray cod, Golden perch and Silver perch may be lost from gravity-fed channels.

Preliminary screen design criteria have been created for Murray–Darling fishes, with laboratory and field trials estimating that if applied correctly, screens could reduce the loss of fish from our rivers by over 90 per cent. These estimates align with the findings of fish tagging studies from the USA which have shown that diversion screens can reduce the entrainment (trapping) of salmon into diversion channels by up to 88 per cent.

Keeping things finteresting

Gravity fed canal diversions like the one shown above can remove tens of thousands of fish a day from a river system. Photos courtesy of the author.

2. Screening can reduce farm operational and maintenance costs

Electricity and fuel costs are two of the biggest expenses facing most irrigation businesses in the MDB. During recent public and private meetings with irrigators, many expressed concern about the constant need to manually deal with debris (and fish) clogging pump outlets. Clogging reduces pump efficiency and increases power consumption. Pumps need to be back flushed (sometimes daily) which adds to labour costs and, in more extreme instances, pumps or outlets would become damaged and inoperable. This is a result of the fact that rudimentary debris screens, often consisting of parallel bars, a grate, or a coarse mesh box, constantly clog and are not designed to exclude fish.

Well-tested and self-cleaning screens are currently used overseas. These use sensor technology to monitor pump performance and automatically clean debris from the screen as required. The result is a screen that does not clog and keeps performing from a pump and fish protection perspective, without the need for constant farmer monitoring and intervention.

3. Screening can improve water efficiency and quality

By reducing the entrainment of debris, screens allow less-efficient water delivery practices to be replaced by more-efficient ones. Examples include the conversion of open channels to piped systems, or the replacement of flood irrigation with centre pivots, micro sprayers or drip lines. In many instances, these upgrades are currently prohibited by the inability to deal effectively with debris.

As an example of what can be achieved, after the installation of a diversion screen comes from the Sisters Irrigation District in Oregon (USA) where 11 kilometres of open channel was replaced with pressurised pipe. This allowed individual farmers to install centre pivots and micro sprayers. As a result, the district now diverts 40 per cent less water to irrigate the same area of land. An added benefit has meant 147 pumps have been removed, at a substantial cost saving.

There are already examples of how similar improvements in water delivery practices have benefited agriculture in the MDB. By converting surface furrow irrigation to subsurface drip technology, tomato farmers have been able to reduce water application rates from 8 to 5 megalitres/hectare, doubling crop yields.

4. Screening will create new and emerging manufacturing and supply opportunities in rural and regional towns

Rural and regional towns need to be more resilient to a future of greater water scarcity. One way of doing this is to explore and invest in new markets and industries that could generate jobs. In countries like the USA a niche manufacturing sector has been established around the design, manufacture, installation and maintenance of diversion screens. It has resulted in the establishment of regional 'screen workshops', many of which offer full-time employment in the design, construction and installation industries. In addition, there are potential market opportunities to be explored more broadly throughout Asia.

A coordinated Basin wide initiative is needed to validate the economic, social and environmental benefits that can be achieved from diversion screening.

Where to now?

By adopting diversion screens there is great potential for irrigators and other water users to be stewards for native fish recovery in the MDB and, by doing so, reduce the operational costs and improve the profitability of their businesses. Fish biologists and irrigation engineers have already completed preliminary investigations that suggest diversion screening has immense potential to deliver benefits for farmers and the environment in the MDB. The community is becoming increasingly aware of this opportunity, and there is growing interest to begin trialling self-cleaning screens as part of a Basin-wide diversion screening initiative.

The initiative would involve pilot trials of well-established technologies at select sites to validate the economic, social and environmental benefits that can be achieved. Critical to this is establishing an oversight committee whose task would be to ensure a coordinated approach to pilot projects throughout the Basin. The expert committee should include biologists, engineers, irrigators and anglers to ensure that appropriate guidance is provided into the design and operation of screens, to assist with project prioritisation, to help identify suitable funding streams, and to ensure that targeted research and evaluation is in place.



A self cleaning rotating pump screen is one of many different types of screening solutions available to keep debris and fish in the river.

FOR FURTHER INFORMATION

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