The Trangie-Nevertire Irrigation Scheme is 100 per cent screened.

TOM RAYNER

Growers on-board with modern pump screens: a win-win situation

Cotton growers are finding many benefits in installing fish screens on their river pumps.

Modern fish-protection screens keep fish and debris in the river and out of irrigation systems. Along with obvious benefits for wildlife, irrigators report cleaner water, reduced clogging of infrastructure, reduced maintenance of pumps and pipes, and significant savings on labour and electricity bills.

Cotton growers including the member-owned Trangie-Nevertire Irrigation Scheme (TNIS) and the Browning family at 'Narramine Station' (Wiradjuri country) installed screens under the Macquarie River Screening Program.

TNIS is now 100 per cent screened. This organisation manages 100,000 hectares of mixed farming, with over 21,000ha under irrigation. They have 33 metered offtakes, with their stock and domestic pipeline running 24/7 servicing 103 metered outlets on 67 farms. Their pump station diverts up to 800 megalitres of water per day, with their screens estimated to protect over 250,000 native fish a year.

Showcase of modern technology

Their screening project is now Australia's largest showcase of modern pump screening designed for fish protection. The main pumping station was upgraded from traditional, ineffective trash racks to four automated, self-cleaning cone screens with three-millimetre stainless steel wedge-wire mesh. The diesel back-up pump next to the main pump station was fitted with a cylinder screen, along with the stock and domestic pump, making the station 100 per cent screened and fish friendly (see breakout for specifics).

The TNIS screens reduce the velocity of water at the intake but don't reduce the volume of water pumped. Pumping is much more reliable because the system doesn't need to be backflushed as often, saving the organisation in electricity costs.

TNIS Water Operations Manager Shane Smith says this provides flow-on benefits for native fish, fishing, farms and the community. He says that members have been delighted with the outcomes of the trials after using modern fish screens for two irrigation seasons.

"We have seen numerous benefits," he said.

"One of the main advantages of the new fish screens is that they minimise the amount of debris in the form of sticks, leaves and gumnuts as well as the aquatic species that get sucked into the irrigation pumps.

"Smaller fish were powerless to prevent themselves being sucked into the old pumps with high intake velocities. Now, fish eggs and small-bodied species can travel right next to the screens without being affected.

"We'd normally backflush every day or every second day before we had the screens. Now it's once a week or we stretch it out to once every 10 days.

"Every time you switch your pumps off and then switch them all back on again, there's a peak in power demand and we get charged for that.

"There was also the flow on effect to individual farms: debris would make it to the farm and block their lateral irrigators.

"If you lower the debris that they get on farm, you save labour for that farmer and you reliably get water that you are meant to be pumping onto a crop which creates a better yield. So, it's a win-win.

"We're saving fish and also doing our members a favour by reducing their operating costs.

"We're also keeping fish in the river, which benefits the environment, fishers, and the local community. Recreational fishing has a very high participation rate, and it can be a drawcard for the local area. The better the fishing, the more visitors, so it also helps cafes, shops, motels and caravan parks.

"Everybody gets a benefit from it, and that's a great outcome."

Assessing environmental and economic impacts

Data is being collected by fish ecologist Dr Craig Boys from NSW DPIRD as part of a research project supported by one of CRDC's sister Research and Development Corporations (RDCs): the Fisheries Research and Development Corporation (FRDC). The project is refining fish-screening technology for pumps and gravity-fed irrigation channels.

Craig's research is being undertaken concurrently with a CRDC-supported project led by Fiona Scott from NSW DPIRD to understand the on-farm economic value of modern screen installations.

Craig says that while fish-screening technology has been used in the United States, United Kingdom and New Zealand for years, Australia has adapted it to ensure screens are tailored to meet our unique river conditions, water operations and native fish species needs. With irrigators' input, the scientists and manufacturers have developed self-cleaning and retractable screens that suit Australian conditions.

"These screens, with a fine mesh and large surface area, safeguard 90 per cent of fish and effectively block nearly all debris," Craig said.

"They reduce water velocity without compromising extraction volume, setting a new standard that offers real benefits for biodiversity and businesses.

"The Macquarie River Screening Program will result in around 70 per cent of regulated flow in the Macquarie River screened by 2026.

TOM RAYNER

ABOVE:
Four, self-cleaning cone screens being fitted to the Trangie-Nevertire Irrigation Scheme main pump.

TOM RAYNER

RIGHT:
Shane Smith says the screens are a win for irrigators and the environment.

"We are working to translate that into how many more fish that is in the river each year replenishing native fish stocks, and the flow-on benefits to farmers, the environment, and to recreational fishing.

"We're monitoring four sites to benchmark fish populations before and after screens are installed and refine our understanding."

The project builds on a previous CRDC-supported project led by Dr Michael Hutchinson from Qld DPI in the Fitzroy Basin. The aim was to inform the prioritisation of screen installations in the Fitzroy and Qld portion of the northern Murray-Darling (Baaka) basins.

The key recommendations from this project were to prioritise mitigation for gravity-fed systems with self-cleaning fish screens, integrate screening solutions during new irrigation developments to lower costs, and to consider retrofitting existing systems when pumps require replacement.

The Qld DPI research also identified a need for further studies on the benefits and cost effectiveness of screening gravity-fed diversions. This informs the project being undertaken by Fiona Scott and NSW DPIRD researchers Salahadin Khairo and Sarah Dadd. They are working with a number of cotton growers in the Macquarie, Namoi and Barwon-Darling valleys to collect data on the economics of installing modern fish screens.

"We are collating data from cotton growers who are in their first season (2024-25) of using the screens and Salahadin and Sarah will meet with them again after harvest to collect more information and feedback," Fiona said.

"We will use this to create case studies that will help growers to make informed investment

decisions around installation.

"Collectively, both projects will report on both the economic and environmental outcomes of screen installation."

Two-fold reasons for growers to get on board

The Browning family grow a mixture of dryland and irrigated crops, which are watered via flood irrigation and centre pivots. Fish screens were installed on their river pumps in May 2024 as part of the Macquarie River Screening Program, which also involves NSW DPIRD and screen manufacturer AWMA Water Control Solutions.

Installing the screens was a decision from two angles.

"First, there's the social and environmental side," Billy Browing says.

"The irrigation industry has copped a bit of criticism in previous years regarding water use, and that's not just a specific crop – that's just irrigation in general.

"We felt that being at the forefront and showing the upside of these fish screens in protecting native fish and waterways would be a great thing to be involved in."

Secondly, Billy says, there's the economics and pump productivity of a fish screen.

"Irrigation pumps functioning well is integral to our business – if they break down, it can pretty much stop the show and of course they never break down in a quiet time, they always break down in a busy period."

He says nozzle blockage on centre pivots was an issue for them.

"With blockages once every four days we have to run around checking them," he said.

"It's not every nozzle on the pivot, but it's common that nozzles get blocked with tiny shrimp heads, gumnuts, pine needles, debris and sticks that are able to go through the pump system.

"And yes, we could get intake filters, but, again, you're having to clean them all the time.

TNIS screen configuration

The TNIS back-up pump on the Macquarie River was fitted with a self-cleaning, T-shaped cylinder screen. This setup is a good option for irrigators with either individual pumps or rows of pumps on a riverbank, by using a joint intake manifold. For easy inspection and maintenance, the screen at TNIS was fitted to rails making it fully retractable using an electric winch. When the screen is up, water passes through a modernised trash rack – effectively returning the site to the old configuration. Like the cone-screen bypass, this provides additional 'insurance'.

The high-tech, modern screens are retractable, so can be moved out of floods and serviced more easily.

"Our screens are down to two millimetres. I believe they won't let anything through to the pump, with the bonus being they're self-cleaning too.

"By putting a fish screen on our pump, we're preventing rocks or sticks entering the impellers. This should increase the life of our pump, and the wear on components – without impacting on productivity.

"The screens should save us from unblocking sprinklers, which means more effective water – actually putting out what you pay for.

"The upside there should be fantastic for us, both labour saving and hopefully yield increasing, and then pump and repair and maintenance costs as well."

CRDC Innovation Broker and CottonInfo Technical Lead for Natural Resource Management Stacey Vogel says action by growers has not been limited to NSW.

"In southern Qld, cotton growers have been a part of the Australian Government Fish Friendly Water Extraction (Qld) project as part of the Northern Basin Toolkit Measures to screen 12 off-take pumps or diversions," she said.

"Focused on the Border Rivers, Lower Balonne and Condamine catchments, the project is designed to complement other fish passage initiatives in NSW and Qld.

"It's fantastic to see cotton growers being involved in these initiatives, and when our project is finished will be in a position to provide sound cost-benefit economics for other growers interested in installing screens."

For more

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