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Pest fish to be tracked by its own DNA

Tilapia, one of North Queensland's most invasive species of introduced freshwater fish, may be tracked by its own DNA, in a new collaborative project between researchers from James Cook University and the Queensland Department of Agriculture, Fisheries and Forestry.

Professor Dean Jerry, Deputy Director of JCU's Centre for Sustainable Tropical Fisheries and Aquaculture, along with DAFF fisheries researcher Dr Richard Saunders, have been awarded a grant from the Invasive Animals Cooperative Research Centre to conduct the two-year project.

Tilapia, which are declared noxious in Queensland, inhabit shallow streams, ponds, rivers and lakes.

Professor Jerry said tilapia are a highly aggressive and invasive fish species originating from Africa. He added they were becoming prevalent in warm water habitats throughout North Queensland and were threatening to invade streams and rivers in the Gulf of Carpentaria. The fish is known to harass and prey on native aquatic fauna.

Professor Jerry said the project 'eDNA as a surveillance tool for tilapia' would help to track the species' movements.

'Environmental DNA, or eDNA, is the material that is floating around in the aquatic environment in the form of free-cells shed or excreted from aquatic organisms,' he said.

'It could be individual cells sloughed from the skins, faecal material or mucus, for example.

'DNA technology has become so powerful over recent years that it is now possible to use eDNA as a detection and water body monitoring tool for a number of fish species, including that of invasive species.'

Professor Jerry said researchers would collect two-litre water samples from bodies of water and filter it to concentrate cells.

‘We then extract the DNA and test the sample against tilapia species-specific DNA probes, which will indicate to us whether or not DNA from our target organism is present in the sample or not.

‘If the test is positive, it shows that our target organism inhabits the water body.

‘The advantage of this technology is that it will reduce the requirement to use previous labour-intensive sampling approaches such as electrofishing or netting, which are relatively expensive and often ineffective at detecting fish with low abundance.’

The work will take place in a range of North Queensland eastern streams, as well as potential invasion front sites in the Gulf of Carpentaria. Sampling and development of the test will occur over the next two years.

Professor Jerry said the use of eDNA as a surveillance tool for tilapia and other pest fish species was an innovative approach.

‘It may enable new outbreaks to be detected much earlier than by using traditional methods, and potentially at a stage where the populations are geographically contained and not well established,’ he said.

He said the project eventually aimed to develop a quick, effective DNA-based test that could be used to routinely monitor water bodies where tilapia were not currently present.

Source: JCU

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